HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Wenatchee Summer Chinook (Dryden Pond) Program
Species or Hatchery Stock	Summer Chinook
Agency/Operator	Washington Department of Fish and Wildlife
Watershed and Region	Wenatchee Subbasin/Columbia Cascade
Date Submitted	
Date Last Updated	September 6, 2005

Section 1: General Program Description

1.1 Name of hatchery or program.

Wenatchee Summer Chinook - Upper Columbia Summer Chinook Salmon Mitigation and Supplementation Program- Eastbank (Rocky Reach and Rock Island Settlement Agreements)

1.2 Species and population (or stock) under propagation, and ESA status.

Upper Columbia River Summer chinook salmon (*Oncorhynchus tshawytscha*); summer-run component upstream of Priest Rapids Dam.

ESA Status: Not listed and not a candidate for listing. In the 1997 "Status Review of Chinook Salmon from Washington, Idaho, Oregon, and California", NMFS indicated that summer/fall chinook salmon in this ESU were not in danger of extinction, nor were they likely to become so in the foreseeable future (Myers et al.1998).

1.3 Responsible organization and individuals.

Name (and title):	Rick Stillwater
	Eastbank Hatchery Complex Manager
Agency or Tribe:	Washington Department of Fish & Wildlife
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

The Anadromous Fish Agreements and Habitat Conservation Plans (Mid-C. HCP) for Wells, Rocky Reach and Rock Island hydropower projects established a formal decision making body for the artificial production programs operated within the region and covered by the Mid-C. HCP. The decision making body, referred to as the Hatchery Committee, is composed of one (1) representative of each Party to include both Douglas and Chelan County PUD representatives (districts), the United States Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), the Washington Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (Colville), the Confederated Tribes and Bands of the Yakama Indian Nation (Yakama), the Confederated Tribes of the Umatilla Indian Reservation (Umatilla) (collectively, the Joint Fisheries Parties or the JFP); and American Rivers, Inc., (American Rivers) a Washington D.C., nonprofit corporation.

The Hatchery Committee is tasked with oversight development of recommendations for implementation of the hatchery elements of the Mid-C. HCP. The Hatchery and Genetic Management Plans (HGMPs) are reflective of the decisions and implementation of actions as deemed appropriate and consistent with the Mid-C. HCP Hatchery Committee. Decisions and implementation actions made by the HCP Hatchery Committee will be dynamic and in the future, current DRAFT HGMPs would need to be updated during this on-going iterative process. Furthermore, the Hatchery Committee is responsible for determining program adjustments considering the methodology described in Biological Assessment and Management Plan (BAMP 1998) and providing recommended implementation plans to the District.

The districts are responsible for funding to include facility improvements, changes to artificial production programs, monitoring and evaluation of programs as identified in the Hatchery Compensation Plan, the Permit and the Agreement. The Districts or its designated agents shall operate the hatchery facilities according to the terms of the Section 8 "Hatchery Compensation Plan", the ESA Section 10 permit(s), and in consultation with the Hatchery Committee.

Co-operators	Role
Public Utility District (PUD) of Chelan County and Public Utility District (PUD) of Douglas County	Funding Sources
Involved parties include those associated with the Columbia River Fish Management Plan and the U.S. v. Oregon court decision	Program Coordination, Co Management, and Policy

1.4 Funding source, staffing level, and annual hatchery program operational costs.

Funding Sources
Public Utility District (PUD) No. 1 of Chelan County
Public Utility District (PUD) No. 1 of Douglas County

Operational Information	Number
Full time equivalent staff	18
Annual operating cost (dollars)	$2,596,000.00

Staff and Budget is used and/or related to the operations of all Eastbank Hatchery Complex (Eastbank Hatchery, Turtle Rock Facilities, Chelan Hatchery, Lake Wenatchee, etc.) Related Programs

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Wenatchee River Summer Chinook
Broodstock collection location (stream, RKm, subbasin)	Dryden Dam Adult Trap-Weir/Wenatchee River/RKm 25.8/Wenatchee and Tumwater Dam Adult Trap-Weir/Wenatchee River/RKm 52.0/Wenatchee
Adult holding location (stream, RKm, subbasin)	Eastbank Hatchery/Columbia River/~RKm 790/Upper-Mid Columbia
Spawning location (stream, RKm, subbasin)	Eastbank Hatchery/Columbia River/~RKm 790/Upper-Mid Columbia
Incubation location (facility name, stream, RKm, subbasin)	Eastbank Hatchery/Columbia River/~RKm 790/Upper-Mid Columbia
Rearing location (facility name, stream, RKm, subbasin)	Eastbank Hatchery/Columbia River/~RKm 790/Upper-Mid Columbia Dryden Pond, located on the Wenatchee River, Washington (WRIA 45-0030) at Rkm 26.0

1.6 Type of program.

Integrated Harvest Program

The Wenatchee summer chinook salmon program is designed to supplement the indigenous summer chinook salmon population in the Wenatchee River and the release sites are well below the spring chinook salmon spawning and early rearing areas. Adult summer chinook salmon produced through the program will therefore contribute to the naturally spawning summer chinook salmon population.

1.7 Purpose (Goal) of program.

The purpose of the propagation program in the Wenatchee River Basin is to mitigate for the loss of summer chinook salmon due to hydropower mortalities at Rocky Reach and Rock Island dams. This goal will be met through the use of the of fish rearing facilities to increase the number of adults that return to the basin by increasing survival at life-history stages where competitive or environmental bottlenecks occur. Concurrently, a release strategy for hatchery production is employed that will not create a new bottleneck in productivity through competition with the naturally produced component of the population and other naturally produced stocks. To accomplish this goal, hatchery rearing and release procedures include acclimation to parent river water for a minimum of six weeks prior to release. This imprinting is expected to reduce straying of these populations into other areas that contain different populations of fish and reduce interbreeding. The rearing and release strategies are specifically designed to (1) imprint the hatchery fish so that returning fish will spawn with the donor population, and (2) minimize adverse interactions (i.e., competition for food or habitat) of hatchery released and naturally produced smolts. All spring/summer chinook populations are reared as yearlings to increase survival and reduce river residence time.

The Rock Island Fish Hatchery Complex (RIFHC) began operation in 1989 as mitigation for salmonids lost as a result of operation of Rock Island Dam. The facility was constructed by, and operates under funding from, Chelan PUD originally through the Rock Island Settlement Agreement. Currently, Chelan PUD and fisheries agencies and the Colville Confederated Tribes have signed a habitat conservation plan (HCP). When the HCP was incorporated into Chelan PUD's FERC license, it superseded the Settlement Agreement. Built in 1989, the Rock Island Fish Hatchery Complex (RIHC) is one of three components of the mitigation agreement relating to the construction of Rock Island Dam. The mitigation agreement requires that hatchery production be equivalent to the number of naturally produced adults lost due to smolt mortality at the Rock Island Dam. Furthermore, the mitigation agreement requires that the hatchery programs be consistent with maintenance of genetically distinct populations.

The goal of the RIFHC is to use artificial production to replace adult production lost due to smolt mortality at mainstem hydroelectric projects, while not reducing the natural production or long-term fitness of salmonid stocks in the area (WDF 1993). Specific goals of the WDFW hatcheries are:

- Hatchery production [in terms of number of fish released from each site],
- Minimize interactions with other fish populations through rearing and release strategies, maintain stock integrity and genetic diversity of each population or unique stock through proper management of genetic resources.
- Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens,
- Conduct environmental monitoring to ensure that the hatchery operations comply with water quality standards and to assist in managing fish health, communicate effectively with other salmon producers and managers in the Columbia River basin, and with implementers of local and regional flow and spill programs, and

- Develop a Conservation Plan and conduct a comprehensive monitoring/evaluation program to determine that the program meets mitigation obligations, estimate survival to adult, evaluate effects of the program on local naturally producing populations, and evaluate downstream migration rates in regards to size and timing of fish released.

1.8 Justification for the program.

The Wenatchee summer chinook salmon program is designed to supplement the indigenous summer chinook salmon population in the Wenatchee River and the release sites are well below the spring chinook salmon spawning and early rearing areas. Adult summer chinook salmon produced through the program will therefore contribute to the naturally spawning summer chinook salmon population. The risk of adverse competitive effects posed by progeny of hatchery-origin summer chinook salmon spawners to listed juvenile spring chinook salmon and steelhead is likely to be low, assuming resource partitioning between fish species that have evolved sympatrically in the Wenatchee River system and the spatial separation of the species. Fish species that evolved sympatrically in the UCR basin have developed slight differences in habitat use that tend to reduce opportunities for interaction, including competition for food resources, rearing space, and spawning areas.

At this time, these fish have a low risk of extinction in the Mid-Columbia Region. There, they predominately have an "ocean-type" life-history, which has among many traits, a tendency to migrate to the ocean as subyearlings (less than a year after they hatch). Currently, more summer and fall chinook salmon are artificially propagated in the region than any other species. Most hatcheries rear them to a yearling stage because they survive better at that age than subyearlings. Current hatchery production is: Wenatchee River, 864,000 yearlings; Methow River, 400,000 yearlings; Okanogan River, 576,000 yearlings; Columbia River at Wells Fish Hatchery (FH), 320,000 yearlings and 484,000 subyearlings; Rocky Reach FH 200,000 yearlings and 1,620,000 subyearlings; and Priest Rapids FH, 5,000,000 subyearlings (2,360,000 yearlings and 7,104,000 subyearlings total). Since yearling chinook salmon released from hatcheries survive at much higher rates than subyearlings (up to 15 times higher), fewer fish need to be propagated as yearlings to meet the compensation levels required under the second objective. In the short-term, this strategy appears to have fewer ecologic impacts to natural fish (although some indicators are inconclusive). However, the Hatchery Work Group recognized that this strategy, in combination with relatively high numbers of naturally spawning hatchery fish, may have deleterious long-term genetic effects to natural fish. This may be impossible to detect in a timely manner. Given these constraints, the chosen strategy is to continue to propagate yearlings to compensate for dam mortalities; evaluate the genetic, ecologic, and demographic characteristics of the natural populations throughout the hatchery program; and recognize the risk that potential impacts may not be detected in sufficient time to correct them. Means to collect and develop local broodstocks on the Methow and Okanogan River will be studied.

The current program is to transfer 900,000 yearling fish from Eastbank Fish Hatchery to Dryden Pond in March. Fish are reared at Eastbank Hatchery to 15 ffp and then transferred to Dryden Acclimation Pond where they are reared and acclimated on Wenatchee river water to 10 ffp and allowed to volitionally migrate in April-May. The Dryden rearing facility consists of a large hypolon-lined rearing pond located adjacent to the Wenatchee River near Dryden, Washington. It is used to acclimate Wenatchee summer chinook. The water supply (16 cfs) originates from an irrigation canal that takes water from the Wenatchee River at Dryden Dam. The intake is 1 km upstream of the pond. The production level for the Wenatchee River is to release 864,000 yearling summer Chinook at 10 ffp. Adults are collected at the left and right bank Dryden traps and Tumwater Dam trapping facility and transported to the Eastbank Hatchery. Incubation, spawning, and initial rearing of Wenatchee summer Chinook take place at the Eastbank facility.

Ocean-type chinook salmon return to the Wenatchee River primarily in July and August, but may enter the river into early October. They spawn in the mainstem Wenatchee River from the outlet of Lake Wenatchee downstream to its confluence with the Columbia River (87 km). Spawning begins in late September upstream from Leavenworth, and ends in early November in the lower river (Peven and Truscott 1995). Juveniles generally emigrate to the ocean as subyearling fry, leaving the Wenatchee River from one to four months after emerging from the gravel in April. Ocean-type salmonids are most dependent on habitat in the mainstem Wenatchee downstream of Plain. From 1960-1994, the average escapement of ocean-type chinook salmon was 8,826 (based on differences in adult and jack counts at Rock Island and Rocky Reach dams), with a range from 3,394 to 13,625.

The production level for the Wenatchee River was originally 864,000 yearling summer Chinook at 10 fish/lb (BAMP 1998) but has since been reduced to current levels. Broodstock (492 adults) are collected at the left and right bank Dryden traps and Tumwater Dam trapping facility and transported to the Eastbank Hatchery. Incubation, spawning, and initial rearing of Wenatchee summer Chinook take place at the Eastbank facility. The fish are then transferred to the Dryden Acclimation Pond towards the end of their second winter, where they are volitionally released at smolt size (10fish/lb.) into the Wenatchee River in April-May.

Authorization through Section 10(a)(1)(B) Permit Number #1347. WDFW and joint permit holders including the Public Utility District No. 1 of Chelan County (Chelan PUD), and the Public Utility District No. 1 of Douglas County (Douglas PUD) have authorization for this program through a Section 10 Permit allowing incidental take of upper Columbia spring chinook and steelhead resulting from the propagation of unlisted sockeye, summer and fall chinook at Eastbank, Wells, Priest Rapids, Lake Wenatchee sockeye, and cooperative releases. The permit expires on October 22, 2013.

The Washington Department of Fish and Wildlife (WDFW), the Public Utility District No. 1 of Chelan County (Chelan PUD), and the Public Utility District No. 1 of Douglas County (Douglas PUD) are authorized to take endangered Upper Columbia River (UCR) steelhead (*Oncorhynchus mykiss*) and endangered UCR spring chinook salmon (*O. tshawytscha*) as a result of artificial propagation programs for the enhancement of UCR steelhead, as cited in the WDFW application and the *Anadromous Fish Agreement and Habitat Conservation Plan (HCP)Wells hydroelectric Project FERC License No. 2149* with Douglas PUD for the operation of Wells Dam (DPUD 2002), the *Anadromous Fish Agreement and Habitat Conservation Plan Rocky Reach Hydroelectric Project FERC License No. 2145* (CPUD 2002a) with Chelan PUD for the operation of Rocky Reach Dam, and the *Anadromous Fish Agreement and Habitat Conservation Plan Rock Island Hydroelectric Project FERC License No. 943* with Chelan PUD for the operation of Rock Island Dam (CPUD 2002b), subject to the provisions of Section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. §§ 1531-1543), NOAA's National Marine Fisheries Service (NMFS) regulations governing ESA-listed species permits (50 CFR Parts 222-226), and the conditions hereinafter set forth.

The permit authorizes the WDFW, the Chelan PUD, the Douglas PUD annual incidental take of adult and juvenile, endangered, naturally produced and artificially propagated, UCR spring chinook salmon and UCR steelhead of ESA-listed species associated with the implementation of non-ESA-listed salmon artificial propagation programs in the UCR region. The programs are intended to supplement naturally spawned unlisted summer chinook salmon, fall chinook salmon, and sockeye salmon (*O. nerka*) production occurring upstream from the vicinity of Priest Rapids Dam on the mainstem Columbia River, including the mainstem Columbia River and the Wenatchee, Methow, and Okanogan Rivers and their tributaries. The artificial propagation programs exist to mitigate for lost salmon, or lost salmon productivity, resulting from the construction and operation of hydroelectric dams on the mainstem Columbia River. With the exception of the Priest Rapids fall chinook salmon

program, all of the programs authorized in this permit are required mitigation in the three long-term HCP agreements mentioned above. The artificial propagation programs may lead to incidental take of migrating ESA-listed adult spring chinook salmon and steelhead during unlisted salmon broodstock trapping activities, and incidental take of rearing and emigrating ESA-listed juvenile spring chinook salmon and steelhead resulting from the release of artificially-propagated unlisted salmon juveniles into the natural environment, and during monitoring and evaluation activities of the hatchery programs that occur in the natural environment. Limitations on unlisted adult salmon broodstock collection locations and timing; limits on the number, timing, and location of juvenile salmon releases; and operational guidelines applied to minimize the risks of disease transmission, water quality impairment, and fish loss through hatchery fish screening or water withdrawals for facility operations are some strategies that the WDFW, the Chelan PUD, and the Douglas PUD will employ to minimize risks to listed fish. Unlisted salmon survival and straying levels will be monitored through externally marking hatchery fish, and/or through internal coded wire or passive integrated transponder (PIT) tagging of a representative proportion of annual juvenile fish releases. The Chelan PUD and the Douglas PUD, as joint permit holders with the WDFW, have specific conditions relating to their involvement and obligation under the HCPs and the permit. The WDFW as the primary operator of the hatchery facilities and as a managing agency of the fish resources of the state, also has specific conditions and responsibilities. The failure of one permit holder to satisfy their conditions may result in the loss of take authorization for all permit holders. Thereby, an interdependent and cooperative relationship should be encouraged in carrying out the authorized activities.

Unlisted salmon artificial propagation program activities will include:

- The collection of broodstock through trapping operations at: Wells Dam for Methow and Okanogan River summer chinook salmon populations, Wells Hatchery for summer chinook salmon releases from Wells and Turtle Rock hatcheries, Dryden and Tumwater Dams for Wenatchee River summer chinook salmon and Wenatchee sockeye salmon, and Priest Rapids Hatchery for Priest River hatchery-origin fall chinook salmon.
- The holding and artificial spawning of collected adults at Wells, Eastbank, and Priest Rapids Hatcheries, and Lake Wenatchee Net Pens.
- The incubation and propagation from the fertilized egg through the fingerling, pre-smolt or smolt life stage at the Wells, Eastbank, and Priest Rapids Hatchery complex facilities.
- The transfer of summer chinook salmon and sockeye salmon fingerlings or pre-smolts from the hatcheries for rearing at facilities in the Wenatchee, Methow, and Okanogan Rivers' watersheds, and to net-pens in Lake Wenatchee.
- The release of summer chinook salmon, fall chinook salmon, and sockeye salmon smolts into the Wenatchee, Methow, and Okanogan Rivers' basins, and into the mainstem Columbia River from the hatcheries, acclimation ponds, and net-pens on those systems.
- The monitoring and evaluation of these artificial propagation programs in the natural environment through activities such as redd counts and carcass surveys, and formal monitoring and evaluation plans to be developed by the HCP Hatchery Committees as called for in the HCPs.

Included in the incidental take are conditions of the permit including:

Section A. Take Description and Levels
Section B. Production Levels
Section C. Program Management and Operating Conditions
Section D. Reports and Annual Authorization
Section E. Penalties and Sanctions

Operation of WDFW Facilities and Practices:

- Water rights are formalized thru trust water rights from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports.
- *National Pollutant Discharge Elimination System Permit Requirements* This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE). This permit sets forth allowable discharge criteria for hatchery effluent and defines acceptable practices for hatchery operations to ensure that the quality of receiving waters and ecosystems associated with those waters are not impaired. Conduct routine water monitoring to ensure that the levels of total suspended solids, settleable solids, and water temperature at each facility to remain compliant with NPDES permits issued by Washington Department of Ecology.
- *Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).
- Conduct routine, generally monthly, fish growth monitoring during rearing at each facility;
- Dispose of juvenile and adult carcasses via the local solid waste management system, on-station burial, or distributing carcasses into the river system of origin for nutrient enhancement after appropriate fish health certification.WDFW proposes to implement the following measures into the propagation program operation to minimize potential negative impacts on ESA-listed species.
- *Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington*. These guidelines define practices that promote maintenance of genetic variability in propagated salmon. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).
- *Spawning Guidelines for Washington Department of Fisheries Hatcheries*. Assembled to complement the above genetics manual, these guidelines define spawning criteria to be use to maintain genetic variability within the hatchery populations. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 7, IHOT 1995).
- *Stock Transfer Guidelines*. This document provides guidance in determining allowable stocks for release for each hatchery. It is designed to foster development of locally-adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDF 1991).

1.9 List of program "Performance Standards".

"Performance Standards" are designed to achieve the program goal/purpose, and are generally measurable, realistic, and time specific. The NPPC "Artificial Production Review" document attached with the instructions for completing the HGMP presents a list of draft "Performance Standards" as examples of standards that could be applied for a hatchery program. If an ESU-wide hatchery plan including your hatchery program is available, use the performance standard list already compiled.

See Section 1.10 below.

1.10 List of program "Performance Indicators", designated by "benefits" and "risks".

"Performance Indicators" determine the degree that program standards have been achieved, and indicate the specific parameters to be monitored and evaluated. Adequate monitoring and evaluation must exist to detect and evaluate the success of the hatchery program and any risks to or impairment of recovery of affected, listed fish populations.

The NPPC "Artificial Production Review" document referenced above presents a list of draft "Performance Indicators" that, when linked with the appropriate performance standard, stand as examples of indicators that could be applied for the hatchery program. If an ESU-wide hatchery plan is available, use the performance indicator list already compiled. Essential 'Performance Indicators" that should be included are monitoring and evaluation of overall fishery contribution and survival rates, stray rates, and divergence of hatchery fish morphological and behavioral characteristics from natural populations.

The list of "Performance Indicators" should be separated into two categories: "benefits" that the hatchery program will provide to the listed species, or in meeting harvest objectives while protecting listed species; and "risks" to listed fish that may be posed by the hatchery program, including indicators that respond to uncertainties regarding program effects associated with a lack of data.

1.10.1) "Performance Indicators" addressing benefits.

(e.g. "*Evaluate smolt-to-adult return rates for program fish to harvest, hatchery broodstock, and natural spawning.*").

1.10.1 Benefits:

Performance Standards	Performance Indicators	Monitoring and Evaluation
1.Increase the number of naturally spawning and naturally produced adults of the target population relative to a non-supplemented population and the changes in the natural replacement rate (NRR) of the supplemented population (reference population) is similar to that of the non-supplemented population.	Natural Replacement Rate (NRR). Ho: Δ Total spawners $_{\text{Supplemented population}} > \Delta$ Total spawners $_{\text{Non-supplemented population}}$ Ho: Δ NOR $_{\text{Supplemented population}} \geq \Delta$ NOR $_{\text{Non-supplemented population}}$ Ho: Δ NRR $_{\text{Supplemented population}} \geq \Delta$ NRR $_{\text{Non-supplemented population}}$	Spawning escapement and spawning origin composition of supplemented and non-supplemented (reference) populations.
2. Maintain run timing, spawn timing, and spawning distribution of endemic populations.	Ho: Migration timing $_{\text{Hatchery}}$ = Migration timing $_{\text{Naturally produced}}$ Ho: Spawn timing $_{\text{Hatchery}}$ = Spawn timing $_{\text{Naturally produced}}$ Ho: Redd distribution $_{\text{Hatchery}}$ = Redd distribution $_{\text{Naturally produced}}$	Monitor and evaluated supplemented and non supplemented (reference) population run-timing, spawn timing and redd distribution.
3. Maintain endemic population genetic diversity, population structure, and effective population size Additionally, determine if hatchery programs have caused changes in phenotypic characteristics of natural populations.	Ho: Allele frequency $_{\text{Hatchery}}$ = Allele frequency $_{\text{Naturally produced}}$ = Allele frequency $_{\text{Donor pop.}}$ Ho: Genetic distance between subpopulations $_{\text{Year x}}$ = Genetic distance between subpopulations $_{\text{Year y}}$ Ho: Δ Spawning Population = Δ Effective Spawning Population	Periodic (each 5 years) genetic analysis of hatchery and naturally adult and juvenile fish in the supplemented population and natural origin fish in the non-supplemented population. Monitor and evaluate run timing, spawn timing, redd distribution, size

	Ho: Age at Maturity $_{\text{Hatchery}}$ = Age at Maturity $_{\text{Naturally produced}}$ Ho: Size at Maturity $_{\text{Hatchery}}$ = Size at Maturity $_{\text{Naturally produced}}$	and age at maturity, and effective population size of supplemented and non-supplemented populations.
4. Achieve/maintain adult-to-adult survival (i.e., hatchery replacement rate) that is greater than the natural adult-to-adult survival (i.e., natural replacement rate) and equal to or greater than the program specific HRR expected value based on survival rates listed in the BAMP (1998).	Ho: HRR $_{\text{Year x}}$ > NRR $_{\text{Year x}}$ Ho: HRR ≥ Expected value per assumptions in BAMP	Monitor and evaluate hatchery and natural adult-to-adult replacement rate in the supplemented populations.
5. Maintain the stray rate of hatchery fish below the acceptable levels to maintain genetic variation between stocks.	Ho: Stray rate $_{\text{Hatchery fish}}$ < 5% of total brood return Ho: Stray hatchery fish < 5% of spawning escapement of other independent populations. Ho: Stray hatchery fish < 10% of spawning escapement of any non-target streams within independent population.	Monitor and evaluate hatchery stray rates and proportional contribution to natural spawning aggregates.
6. Provide release of hatchery fish consistent with programmed size and number.	Ho: Hatchery fish $_{\text{Size}}$ = Programmed $_{\text{Size}}$ Ho: Hatchery fish $_{\text{Number}}$ = + 10% of Programmed $_{\text{Number}}$	Monitor fish size and number at release.
7. Maintain the proportion of hatchery fish on the spawning grounds at a levels that minimize negative affects to freshwater productivity (i.e., number of smolts per redd) of supplemented streams when compared to non-supplemented streams with similar adult seeding levels.	Ho: Δ smolts/redd $_{\text{Supplemented population}}$ > Δ smolts/redd $_{\text{Non-supplemented population.}}$	Monitor and evaluate annual smolt production in supplemented and non-supplemented populations. Monitor and evaluate redd deposition in supplemented and non-supplemented populations.
8. Provide no significant increase in incidence of BKD in the natural and hatchery populations.	Ho: Conc. $_{\text{BKD}}$ supplemented fish $_{\text{Time x}}$ = Conc. $_{\text{BKD}}$ supplemented fish $_{\text{Time x}}$ Ho: Conc. $_{\text{BKD}}$ supplemented stream $_{\text{Time x}}$ = Conc. $_{\text{BKD}}$ non-supplemented stream $_{\text{Time x}}$ Ho: Conc. $_{\text{BKD}}$ hatchery effluent $_{\text{Time x}}$ = Conc. $_{\text{BKD}}$ hatchery effluent $_{\text{Time x}}$ Ho: Conc. $_{\text{BKD}}$ supplemented stream $_{\text{Upstream Time x}}$ = Conc. $_{\text{BKD}}$ hatchery effluent $_{\text{Time x}}$ = Conc. $_{\text{BKD}}$ supplemented stream $_{\text{Downstream Time x}}$ Ho: Hatchery disease $_{\text{Year x}}$ = Hatchery disease $_{\text{Year y}}$	Perform diagnostic disease investigations in the hatchery population and natural population, in supplemented and non-supplemented streams.

9. Minimize adverse impacts to non-target taxa of concern (NTTOC).	Ho: NTTOC abundance $_{\text{Year x through y}}$ = NTTOC abundance $_{\text{Year y through z}}$ Ho: NTTOC distribution $_{\text{Year x through y}}$ = NTTOC distribution $_{\text{Year y through z}}$ Ho: NTTOC size $_{\text{Year x through y}}$ = NTTOC size $_{\text{Year y through z}}$	

1.10.1 Risks:

Performance Standards	Performance Indicators	Monitoring and Evaluation
1. Artificial propagation activities comply with ESA responsibilities to minimize impacts and/or interactions to ESA listed fish	Project complies with Section 10 permit conditions including juveniles are raised to yearling smolt-sizes (10 fish/lb). All fish are adipose fin clipped and CWT to identify them from naturally produced fish.	As identified in the HGMP: Monitor size, number, date of release and mass mark quality. Additional WDFW projects: straying, instream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds, fish health documented. Required data are generated through the M & E plan and provided to NOAA Fisheries as required per annual report compliance.
2. Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring.	All facilities meet WDFW water right permit compliance and National Pollution Discharge Elimination System (NPDES) requirements - WAG-5014.	Flow and discharge reported in monthly NPDES reports. Environmental monitoring of total suspended solids, settle-able solids, in-hatchery water temperatures, in-hatchery dissolved oxygen, nitrogen, ammonia, and pH will be conducted and reported as per permit conditions.
3. Water intake systems minimize impacts to listed wild salmonids and their habitats.	Water withdrawal – permits have been obtained to establish water rights for each hatchery facility. Intake screens – designed and operated to assure approach velocities and operating conditions provide protection to wild salmonid species.	Intake system designed to deliver permitted flows. Operators monitor and report as required Hatcheries participating in the programs will maintain all screens associated with water intakes in surface water areas to prevent impingement, injury, or mortality to listed salmonids.
4. The risk of catastrophic fish loss due to hatchery facility or operation failure is minimized.	Staffing allows for rapid response for protection of fish from risk sources (water loss, power loss, etc.). Backup generators to provide an alternative source of power to supply water during power outages. Protocols in place to test standby generator and all alarm systems on a routine basis. Multiple rearing sites or footprints for captive broodstock rearing. Alarm systems installed and operating at each rearing vessel to detect loss of or reduced flow and reduced operating head in rearing vessels. Densities at minimum to reduce risk of loss to disease	Hatchery engineering design and construction accommodate security measures. Operational funding accommodates security measures. Training in proper fish handling, rearing, and biological sampling for all staff. Staff are trained to respond to alarms and operate all emergency equipment on station. Maintenance is conducted as per manufacturer's requirements and according to hatchery maintenance schedules.

	Sanitation – all equipment is disinfected between uses on different lots of fish including nets, crowders, boots, raingear, etc.	
5. Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including IHOT, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed
6. The risk of catastrophic fish loss due to hatchery facility or operation failure is minimized.	Staffing allows for rapid response for protection of fish from risk sources (water loss, power loss, etc.). Backup generators to provide an alternative source of power to supply water during power outages. Protocols in place to test standby generator and all alarm systems on a routine basis. Multiple rearing sites or footprints for captive broodstock rearing. Alarm systems installed and operating at each rearing vessel to detect loss of or reduced flow and reduced operating head in rearing vessels. Densities at minimum to reduce risk of loss to disease. Sanitation – all equipment is disinfected between uses on different lots of fish including nets, crowders, boots, raingear, etc.	Hatchery engineering design and construction accommodate security measures. Operational funding accommodates security measures. Training in proper fish handling, rearing, and biological sampling for all staff. Staff are trained to respond to alarms and operate all emergency equipment on station. Maintenance is conducted as per manufacturer's requirements and according to hatchery maintenance schedules.
7. Broodstock collection and juvenile hatchery releases minimize ecological effects on listed wild fish.	Summer chinook reared to sufficient sizes such that smoltification occurs within nearly the entire population, reducing residence time in streams after release (CV length ≤ 10%, condition factor 0.9 – 1.0). All listed fish encountered in hatchery broodstock collection operations will be held for a minimal duration in the traps; generally less than 24 hrs and follow permit protocols. Listed fish trapped in excess of broodstock collection goals will be released upstream or returned to natal streams immediately. Smolts acclimated and imprinted on surface water from the natal steam to enhance smoltification and reduce residence time in the tributaries and mainstem migration corridors.	Fish culture and evaluation staff monitor behavior, coefficient of variation in length, and condition. Fish health specialists will certify all hatchery fish before release. Downstream juvenile smolt traps can be used to monitor the outmigration of hatchery and wild fish. Outmigration may also be monitored through PIT tag detection systems at mainstem passage facilities. Broodstock collection protocols will developed each season and reviewed by the HCP Hatchery committees.

1.11.1 Proposed annual broodstock collection level (maximum number of adult fish).

Adult collection goal is at least 460 salmon (adults and jacks) collected from the Wenatchee River and transferred to Eastbank Hatchery. Egg take goal is 1,108,000 (FBD 2005).

1.11.2 Proposed annual fish release levels (maximum number) by life stage and location.

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Yearling	864,000	10.0	Mid April-Early May	Wenatchee	25.8	Wenatchee	Columbia Cascade

The egg take goal is 1,080,000 with the transfer goal of 900,000 fish to Dryden Pond. WDFW shall limit annual production of Wenatchee summer chinook salmon for release into the Wenatchee River to not exceed 864,000 yearling juveniles released in April to May. These juveniles will be externally marked with an adipose fin-clip and internally tagged prior to release.

1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

In the Columbia River, ocean-type chinook salmon released as yearlings have consistently survived better than those released as sub-yearlings In the Columbia River, the benefits of rearing juveniles through a yearling stage include (1) improved passage through hydroelectric dams, through coincidental timing of releases with increased flows and spill (Raymond 1988); (2) better fish guidance efficiency of yearlings at the dams because of behavioral and buoyancy changes (Giorgi et al. 1988); (3) decreased susceptibility to predators (Poe et al. 1991); and (4) improved swimming performance of larger smolts (Park 1969). Based upon smolt production numbers to necessary to achieve hatchery compensation objectives, the difference in production required between yearling and sub-yearling ocean-type chinook salmon is on the order of 0.24. In other words, for every 1,000 sub-yearling summer chinook smolts to be produced for compensation, 240 yearling smolts could be produced in lieu of the sub-yearlings. This ratio was derived from observed differences in survival between yearling and sub-yearling releases from Wells FH. The appropriate mix of yearling and sub-yearling smolts has been evaluated through the Mid Columbia Hatchery Plan to minimize the risk of this increased hatchery production on the existing natural production. Smolt to adult survival rates for summer/fall chinook produced in WDFW hatchery programs within the region have been estimated to range from 0.07 % to 3.62 %, averaging 1.49 % (smolt to adult overall survival estimates for brood year 1982-87 for Rocky Reach Hatchery releases from Chapman et al. 1994). It is assumed that current program will have similar performance of SAR, and provide harvestable numbers according to the settlement agreements. SARs for yearling releases have been increasing in the late 1990's (Table 1). A comparison of other summer chinook programs of yearling releases are provided in Table 2.

Table 1. Data available for fingerling and yearling SARs to brood year 1999. Data from the APRE website and RMIS (1998 & 1999).

Brood Year	Smolt to Adult Survival (%)
1990	0.09
1991	0.04
1992	0.10

1993	0.08
1994	0.42
1995	0.22
1996	0.09
1997	1.84
1998	1.12
1999	0.18*
2000	Na
2001	Na
2002	Na
2003	Na

*Preliminary numbers only.

Table 2. Estimated survival rates for WDFW summer yearling smolt releases from Wells, Turtle Rock, Wenatchee, Methow and Okanogan River systems. Years 1976-1989 are taken from the Mid-Columbia Hatchery Plan (BAMP 1998) with recent data through BY 1999 derived from RMIS.

Hatchery	Age at Release	Release years	Release years survival rate (%)	Brood Years 1995 – 1999	Release years survival rate (AVG %)
Wenat-chee (Dryden Pond)	1+	Na	Na	0.22 (1995) 0.09 (1996) 1.84 (1997) 1.12 (1998) 0.18 (1999)*	0.69%
Wells	1+	1976-1989	0.410	0.40 (1995) 0.46 (1996) 2.78 (1997) 2.19 (1998) 0.39 (1999)*	1.244%
Rocky Reach (Turtle Rock)	1+	1984-1989	1.366	0.69 (1995) 0.76 (1996) 2.35 (1997) 2.57 (1998) 0.65 (1999)*	1.404%
Methow River (Carlton Pond)	1+	Na	Na	0.06 (1995) 0.03 (1996) 0.16 (1997) 1.82 (1998) 0.005 (1999)*	0.383%
Similka-meen Pond	1+	Na	Na	0.48 (1995) 0.009 (1996) 3.10 (1997)	1.297%

				2.63 (1998) 0.27 (1999)*	

* Preliminary numbers only.

Table 3. Wenatchee Summer Chinook Escapement from 1989 – 2003 based upon Rock Island/Rocky Reach interdam difference.

Return Year	Number of Adults	Return Year	Number of Adults
1989	17,015	1998	6,588
1990	12,337	1999	7,392
1991	10,383	2000	18,685
1992	8,618	2001	23,953
1993	10,089	2002	17,066
1994	10,563	2003	31,146
1995	11,271	2004	NA
1996	6,691	2005	NA
1997	5,999		

Table 4. Upper Columbia natural summer chinook spawning escapement estimates (return years1979-1991 from WDF and WDW 1993). Peak number of summer chinook redds estimates or counted during spawning surveys on the Wenatchee, Methow, Okanogan and Similkameen Rivers

Year	**Wenatchee**	**Methow**		**Okanogan**		**Similkameen**	
	Spawning Estimates	Aerial	Ground	Aerial	Ground	Aerial	Ground
1980	8,995	345	-	118	-	172	-
1981	4,515	195	-	55	-	121	-
1982	4,113	142	-	23	-	56	-
1983	3,937	65	-	36	-	57	-
1984	8,420	162	-	235	-	301	-
1985	9,185	164	-	138	-	309	-
1986	10,021	169	-	197	-	300	-
1987	9,831	211	-	201	-	164	-
1988	10,389	123	-	113	-	191	-
1989	12,764	126	-	134	-	221	370
1990	9,343	229	-	88	47	94	147
1991	7,144	-	153	55	64	68	91
1992	9,312	-	107	35	53	48	57
1993	7,469	-	154	144	162	152	288
1994	8,006	-	310	372	375	463	777
1995	6,178	-	357	260	267	337	616
1996	4,879	-	181	100	116	252	419
1997	4,719	-	205	149	158	297	486
1998	3,984	-	225	75	88	238	276
1999	4,376	-	448	222	369	903	1,275
2000	4,448	-	500	384	549	549	993
2001	9,142	-	675	883	1,108	865	1,540
2002	Na	-	2,013	1,958	2,667	2,000	3,358
2003	Na	-	1,624	1,099	1,035	103	378
2004	Na	-	973	1,310	1,327	2,127	1,660
2005	-	-	-	-	-	-	-

1.13 Date program started (years in operation), or is expected to start.

The first year of operation for this hatchery was 1990. Hatchery production of summer chinook in the region has been continuous since implementation of the Grand Coulee Fish Maintenance Project (GCFMP), with several USFWS hatcheries constructed beginning in 1941 on the Wenatchee, Entiat, and Methow Rivers (Waknitz et al. 1995). The WDFW hatcheries currently producing summer chinook smolts were constructed in the mid-1960s (Turtle Rock), 1967 (Wells), 1989 (Eastbank), and 1990 (Similkameen Pond, Dryden Pond, and Carlton Pond).

1.14 Expected duration of program.

The supplementation program will continue with the objective of mitigating for the loss of summer chinook salmon productivity caused by hydroelectric dams in the Columbia River Basin; in particular the Rock Island, Rocky Reach, and Wells hydroelectric projects.

1.15 Watersheds targeted by program.

Summer chinook salmon propagated and released through the Wenatchee River and Methow/Okanogan river (Wells) supplementation programs originated from natural and hatchery-origin broodstock returning to those systems. The targeted watersheds are tributary to the upper Columbia River (WRIA 48-0001). The Wells and Rocky Reach enhancement programs are not specifically designed and operated to achieve supplementation objectives, although returning summer chinook are known to contribute to hatchery broodstocks and to natural escapement of the larger, homogenous summer/fall chinook ESU.

1.16 Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

WENATCHEE SUMMER CHINOOK

1.16.1 OVERVIEW

Wenatchee summer chinook hatchery program level is an 864,000 yearling released at 10 fish per pound (FPP) program. The program is the result of mitigation agreements for Rock Island Dam. The goal of the program is to supplement the natural population. Fish are reared on well water at Eastbank FH and transferred to Dryden Pond in the spring for acclimation on Wenatchee River water. Limited capital expenditures and inadequate hatchery facilities, associated with disease segregation and long term acclimation, have been the prominent issues with this program.

Adequate broodstock are collected from existing facilities on the Wenatchee River (i.e. Dryden and Tumwater Dams) in most years. Although traps are efficient to achieve broodstock collection goals, removing fish from the traps is difficult and needs to be addressed.

Wenatchee summer chinook in most years must be reared according to enzyme liked immunosorbant assay (ELISA) determinations to minimize the risk of large-scale loss to bacterial kidney disease (BKD). Under this program design the current juvenile facilities are inadequate to rear and acclimate fish at the appropriate densities according to their respective health risk. A single large acclimation pond (e.g., Dryden Pond) does not allow groups of fish with different health risks to be acclimated. High-risk fish are reared entirely at Eastbank FH and direct planted into the Wenatchee River. These fish do not receive a benefit of acclimation and poses additional constraints on Eastbank FH.

Currently, fish are not acclimated on surface water for longer than 2 months. As a result, smolt to adult survival is lower than expected and straying outside the Wenatchee River is higher than expected.

1.16.2 POTENTIAL ALTERNATIVES

ALTERNATIVE 1

Without adequate rearing and acclimation space to accommodate segregation by disease risk as well as long-term acclimation (5-7 months), the program will continue to result in less than optimal smolt to adult survival as well higher than desired straying outside the Wenatchee River Basin.

ALTERNATIVE 2 (WDFW endorsed)

Modify Dryden Pond to allow segregated acclimation of all summer chinook regardless of ELISA risk. Explore water source to provide long term over winter acclimation (October through May) to improve imprinting and minimize straying. Construct additional acclimation pond(s) in the upper basin to distribute returning spawner effort more equally throughout the basin. Additional sites should also have overwinter capability.

Divided acclimation ponds as well as over winter acclimation locations higher in the Wenatchee River Basin would result in a lower incidence of straying as well as producing a higher quality smolt that survives to adult at a higher rate. Rearing higher disease risk progeny on surface water may increase the probability of disease outbreaks.

1.16.3 POTENTIAL REFORMS AND INVESTMENT

Long-term acclimation facilities with the flexibility to rear several independent groups of fish would produce a higher quality smolt that survives at rates higher than short term acclimated populations. Survival benefits have been observed in this stock when long-term overwinter acclimation was available (e.g. Chiwawa Ponds). Long-term acclimation facilities would also reduce the well water requirements at hatcheries that could be used for other stocks.

Section 2: Program Effects on ESA-Listed Salmonid Populations

2.1 List all ESA permits or authorizations in hand for the hatchery program.

WDFW has the following permits for hatchery operations in the Upper and Mid-Columbia:

Section 10(a)(1)(B) Permit Number 1347 Permit Type: Incidental take of upper Columbia spring chinook and steelhead resulting from the propagation of unlisted sockeye, summer and fall chinook at Eastbank, Wells, Priest Rapids, Lake Wenatchee sockeye, and cooperative releases. Expires October 22, 2013.

Section 10(a)(1)(B) Permit Number 1196 Permit Type: Scientific Research/Enhancement-Artificial production of upper Columbia spring chinook. Expires Dec 31, 2007 but was amended on January 20, 2004 and expires January 20, 2014. Activities described in the application for this permit have been authorized under terms and conditions of the Biological Opinion on Artificial Propagation in the Columbia River Basin (NMFS 1999). WDFW submits annual reports as conditioned by Section 10 permit # 1196 Section **Permit # - 1196** covering the period from January 1- December 31 each year. Broodstock retained may be used in the USFWS's Winthrop NFH Methow River Basin supplementation programs. Methow Fish Hatchery Complex activities are coordinated with the U.S. Fish and Wildlife Service (USFWS) spring chinook artificial supplementation program at the Winthrop NFH (ESA Section 10 Permit #1300).

Section 10(a)(1)(B) Permit Number: 1395 Permit Type: Direct Take (artificial propagation of listed steelhead) authorizes the WDFW, the Chelan PUD, and the Douglas PUD annual take of ESA listed adult and juvenile, endangered, naturally produced and artificially propagated, UCR steelhead and UCR spring chinook salmon associated with the implementation of UCR steelhead artificial propagation enhancement programs in the UCR region. The programs are intended to supplement naturally spawning UCR steelhead production occurring upstream from Priest Rapids Dam on the mainstem Columbia River, including the Wenatchee, Methow, and Okanogan Rivers, and their tributaries. Expires October 2, 2013.

Section 10(a)(1)(B) Permit Number: **1248 Permit Type:** Incidental take of ESA-listed anadromous fish species associated with seven recreational fishery programs to be conducted above Priest Rapids Dam on the Columbia River. This permit expired at the end of 2004 and is being renewed to include all fisheries above the Highway 395 Bridge in Pasco. This permit was submitted to NOAA for a renewal March 16, 2005 and is awaiting approval.

Section 10(a)(1)(B) Permit Number: 1482 (1203) Authorizes the take of ESA-listed upper Columbia River salmon and steelhead associated with research activities in the upper Columbia River Basin. This permit was modified in 2004 and the issue date is pending NOAA approval.

Authorizations

FERC processes:
Under current settlement agreements and stipulations, the three mid-Columbia PUDs pay for the operation of hatchery programs within the Columbia Cascade Province. These programs determine the levels of hatchery production needed to mitigate for the construction and continued operation of the PUD dams.

Habitat Conservation Plans:
In 2002, habitat conservation plans (HCPs) were sIgned by Douglas and Chelan PUDs, WDFW, USFWS, NOAA Fisheries, and the Colville Confederated Tribes. The overriding goal of the HCPs are to achieve no-net impact on anadromous salmonids as they pass Wells (Douglas PUD), Rocky Reach,

and Rock Island (Chelan PUD) dams. One of the main objectives of the hatchery component of NNI is to provide species specific hatchery programs that may include contributing to the rebuilding and recovery of naturally reproducing populations in their native habitats, while maintaining genetic and ecologic integrity, and supporting harvest. The PUDs can be added as joint Section 10 permit holders (#1196) in accordance with the three HCPs such as happened in 2004.

Biological Assessment and Management Plan:
The biological assessment and management plan (BAMP) was developed by parties negotiating the HCPs in the late 1990s. The BAMP was developed to document guidelines and recommendations on methods to determine hatchery production levels and evaluation programs. It is used within the HCP as a guiding document for the hatchery programs.

2.2 Provide descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

2.2.1 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

Describe the status of natural population relative to critical and viable population thresholds.
The natural summer chinook salmon populations in the upper Columbia Basin are healthy (Wenatchee River) or depressed (Methow River and Okanogan Basin) in status (WDF et and WDW 1993). The Upper Columbia River summer/fall chinook ESU including these populations has been judged as not warranting listing under ESA protective provisions (Myers et al. 1998).

Identify the NMFS ESA-listed population(s), that will be directly affected by the program.
None.
Identify the NMFS ESA-listed population(s), that may be directly affected by the program.

Upper Columbia River ESU spring chinook (*Oncorhynchus tshawytscha*). All spring chinook in the Upper Columbia ESU were listed as Endangered under the ESA. Listed as an endangered species on March 24, 1999.

Upper Columbia River ESU summer steelhead trout (*Oncorhynchus mykiss).* On August 18, 1997 summer steelhead in the Upper Columbia River ESU were listed as Endangered under the ESA. Listed as an endangered species on Aygust 18, 1997.

Bull Trout populations (*Salvelinus confluentus*). Columbia River Distinct Population Segment) On June 12, 1998 bull trout in the Upper Columbia Distinct Population Segment (DPS) were listed as threatened under federal ESA by the USFWS.

Other salmonid species -
Sockeye salmon in the region were judged as neither in danger of extinction or likely to become so in the foreseeable future by NMFS in the west coast sockeye salmon species status review (Gustafson et al. 1997).

Other ESA-listed species of significance to the summer chinook programs include those that originate in other watersheds within the Columbia River Basin: Middle Columbia River ESU steelhead - "threatened"; Snake River ESU sockeye - "endangered"; Snake River ESU spring chinook - "threatened"; Snake River ESU fall chinook - "threatened"; Snake River ESU steelhead - "threatened"; Lower Columbia River ESU chinook - "threatened"; Lower Columbia River ESU chum - "threatened"; Lower Columbia River ESU steelhead - "threatened"; and Lower Columbia/Southwest Washington ESU coastal cutthroat - "threatened".

2.2.2 Status of ESA-listed salmonid population(s) affected by the program.

Describe the status of natural population relative to critical and viable population thresholds.
Critical habitat was designated for UCR spring chinook salmon and UCR steelhead in 2000 when

NMFS published a final rule in the Federal Register (February 16, 2000 65 FR 7764). However, the critical habitat designations were vacated and remanded to NMFS for new rulemaking pursuant to a court order in April 2002. The designation of critical habitat for the UCR spring chinook salmon ESU or UCR steelhead ESU will trigger a re-initiation of ESA consultation.

- **Provide the most recent 12 year (e.g. 1988-present) progeny to parent ratios, survival data by life stage, or other neasures of productivity for the listed population. Indicate sources of these data.**
- **Provide the most recent 12 year (e.g. 1988-present) estimates of annual spawning abundance estimates, or any other abundance information. Indicate sources of these data.**
- **Provide the most recent 12 year (e.g. 1988-present) estimates of annual proportions of direct hatchery origin and listed natural origin fish on the natural spwning grounds, if known. Indicate sources of these data.**

Sources for these sections are taken from the Section 10 Direct Take Permit (#1395, #1196), WDFW Application for Permits # 1395 and #1196 and ESA Section 7 Consultations for Permit # 1395 – 2002, and #1196 - 1998).

Upper Columbia River ESU summer steelhead: The ESU includes naturally-spawned populations of steelhead in tributaries of the Columbia River upstream from the Yakima River, including the Okanogan River. The Wells Hatchery stock steelhead were included in the listed ESU. Critical habitat for the ESU was designated on February 16, 2000 and included all river reaches accessible to listed steelhead (and associated riparian zones) in Columbia River tributaries between the Yakima River and Chief Joseph Dam (NPPC 2001). Survival of natural-origin steelhead has been severely depressed such that 81% of the natural spawning escapement is hatchery-origin fish (Busby 1996 as quoted in Bugert 1998). The Wells Hatchery steelhead stock is considered essential for recovery, and is included in the listing. Since 1997, the WDFW has been developing a Wenatchee River stock for the juvenile released into the Wenatchee basin. Currently, there is probably a close resemblance between the natural and hatchery populations in this ESU because of the incorporation of naturally-spawning adults into the hatchery program and the large number of hatchery fish that have been spawning in the natural environment (65-80 percent of the spawning population in the Methow basin; Busby *et al.* 1996). Since natural replacement rates of UCR steelhead are low (0.3:1), the hatchery supplementation programs were determined to be essential for recovery and included in the endangered listing under the ESA. These hatchery fish could be used to reduce the short-term risk of extinction and aid in the recovery of the UCR steelhead ESU.

Although the life history of this ESU is similar to that of other inland steelhead, smolt ages are some of the oldest on the west coast (up to 7 years old), probably due to the ubiquitous cold water temperatures (Mullan *et al.* 1992). Adult steelhead from this ESU enter the lower Columbia between May and September with fish arriving at Wells Pool in early July. Fish enter the Wenatchee and Methow Rivers in mid-July and peak between mid-September and October. During winter, adult steelhead generally return to the warmer Columbia River and re-enter the Methow to begin spawning in mid-March after the ice has thawed. Spawning continues through May and many fish seek out higher reaches in the tributaries. Fry emergence occurs that summer and juveniles rear for two to four years prior to spring downstream migration. On April 4, 2002, NOAA Fisheries defined interim abundance recovery targets for each spawning population in this ESU (Table 5). These targets are intended to represent the number and productivity of naturally produced spawners that may be needed for recovery, in the context of whatever take or mortality is occurring. They should not be considered in isolation, as they represent the numbers that, taken together, may be needed for the population to be self-sustaining in its natural ecosystem. For UCR steelhead, the interim recovery levels are 2,500

spawners in the Wenatchee River, 500 spawners in the Entiat River, and 2,500 spawners in the Methow River (Table 5).

Table 5. Interim abundance targets of naturally produced steelhead by basin and approximate natural origin broodstock collection goal.

Basin	Interim Abundance Target	Broodstock Goal
Wenatchee	2,500	at least 104 [a]
Entiat	500	- -
Methow	2,500	maximum 123 [b]
Okanogan	600	16
Small Tributaries	200	- -
Total	**6,300**	**243**

[a] *Proportional to run-at-large in years when run is composition is 50% or greater natural origin steelhead, otherwise goal is 50% naturally produced steelhead. Total broodstock collection goal is generally about 208 steelhead..*

[b] *Combined WDFW Methow/Okanogan programs will not exceed 30% natural origin steelhead in the broodstock. Up to 373 steelhead may be collected for broodstock total.*

Returns of both hatchery and naturally produced steelhead to the UCR basin have increased in recent years. The average 1997-2001 return counted through the Priest Rapids Dam fish ladder was approximately 12,900 fish. The average for the previous five years (1992-1996) was 7,800 fish. Abundance estimates of returning naturally produced UCR steelhead have been based on extrapolations from mainstem dam counts and associated sampling information (e.g.,hatchery/natural fraction, age composition). The natural component of the annual steelhead run over Priest Rapids Dam increased from an average of 1,040 (1992-1996), representing about 15 percent of the total adult count, to 2,200 (1997-2001), representing about 17 percent of the adult count during this period of time (BRT 2003). In terms of natural production, recent population abundances for both the Wenatchee/Entiat river aggregate population and the Methow population remain well below the interim recovery levels developed for these populations (BRT 2003). A 5-year geometric mean (1997-2001) of approximately 900 naturally produced steelhead returned to the Wenatchee and Entiat rivers (combined) compared to a combined abundance target of 3,000 fish. Although this is well below the interim recovery target, it represents an improvement over the past (an increasing trend of 3.4 percent per year). However, the average percentage of natural fish for the recent 5-year period dropped from 35 to 29 percent, compared to the previous status review. For the Methow population, the 5-year geometric mean of natural returns over Wells Dam was 358. Although this is well below the interim recovery target, it represents an improvement over the past (an increasing trend of 5.9 percent per year). In addition, the estimated 2001 return (1,380 naturally produced spawners) was the highest single annual return in the 25-year data series. However, the average percentage of natural origin spawners dropped from 19 percent for the period prior to the 1998 status review to 9 percent for the 1997 to 2001 returns. Naturally produced steelhead made up an average of 17.8 percent of the steelhead run at Priest Rapids Dam during the 18-year period from 1986 to 2001. These natural origin steelhead are not equally distributed among the UCR tributary basins. Mullen *et al*. (1994) reported annual escapement to the Methow basin at only 10 percent natural origin steelhead; however, in recent years the WDFW (2002) report natural origin steelhead composition of 5 to 11 percent in 1998 through 2000 at Wells Dam. The escapement to the Wenatchee basin from 1998 to 2000 averages 430 natural origin steelhead.

The average 2000- 2003 return counted through the Priest Rapids Dam fish ladder was approximately 18,620 fish with 3049 wild fish. The 1997-2001 return counted through the Priest Rapids Dam fish ladder was approximately 12,900 fish. The average for the previous five years (1992-1996) was 7,800 fish. By October 2004, over 18,000 steelhead had passed Priest Rapids Dam by early October. The natural component of the annual steelhead run over Priest Rapids Dam increased from an average of 1,040 (1992-1996), representing about 15 percent of the total adult count, to 2,200 (1997-2001), representing about 17 percent of the adult count during this period of time (BRT 2003). In terms of natural production, recent population abundances for both the Wenatchee/Entiat river aggregate population and the Methow population remain well below the interim recovery levels developed for these populations (BRT 2003).

Upper Columbia River ESU Spring Chinook:

The UCR spring chinook salmon ESU, listed as endangered on March 24, 1999 (64 FR 14308), includes all natural-origin stream-type chinook salmon from river reaches above Rock Island Dam and downstream of Chief Joseph Dam, including the Wenatchee, Entiat, and Methow River Basins (Myers *et al.* 1998). All stocks, with the exception of the Methow stock, were considered by WDF *et al.* (1993) to be of native origin, of natural production type, and as depressed in status. When listing the UCR spring chinook salmon as endangered, NMFS included six hatchery populations as part of the ESU: Chewuch River, Methow River, Twisp River, Chiwawa River, White River, and Nason Creek. These six hatchery populations were considered to be essential for recovery and were therefore listed as part of the ESU. Hatchery populations that were derived from Carson spring chinook salmon stock at Leavenworth, Entiat and Winthrop National Fish Hatcheries were not included as part of the ESU.

NMFS has proposed Interim Recovery Abundance Levels and Cautionary Levels (Ford *et al.*2001). Cautionary Levels were characterized as natural origin abundance levels that the population fell below only about 10 percent of the time during a historical period when it was considered to be relatively healthy. The three independent populations of spring chinook salmon identified for the ESU include those that spawn in the Wenatchee, Entiat, and Methow Basins (Ford *et al.* 2001).

All three of the existing UCR spring chinook salmon naturally reproducing populations have exhibited similar downward trends and patterns in abundance over the past 40 years (NMFS 2003c, 2003d, 2003e). Assuming that population growth rates were to continue at 1980-2000 levels, UCR spring chinook salmon populations are projected to have very high probabilities of 90 percent decline within 50 years (87 to 100 percent). Redd counts in the three basins have improved in recent years, largely because of natural spawning by artificially propagated spring chinook salmon (Grassell 2003; Grassell 2004; Mosey and Murphy 2002; Hamstreet and Carie 2004; Humling and Snow 2004). Artificially propagated juvenile spring chinook salmon are released into the Chiwawa River with the expectation that as adults they will return and spawn in the Chiwawa River. In reality, these hatchery released fish have contributed an average of 50 percent of the spawners in the Chiwawa River and an average of 25 percent of the spawners in Nason Creek (Andrew Murdoch, WDFW, pers. com.). The propagation program spring chinook salmon that return to spawn in Nason Creek are considered strays and of potential adverse risk to the Nason Creek component of the population; measures to improve the fidelity of hatchery reared spring chinook salmon to the Chiwawa River are being explored. Additionally, a new artificial propagation program that releases locally derived juveniles into Nason Creek is likely to occur within the next five years. The reproductive effectiveness of these hatchery-origin salmon is not known at this time. However, preliminary indications in the Wenatchee River Basin suggest that the Chiwawa spring chinook salmon program is contributing to natural reproduction in successive generations (Andrew Murdoch, WDFW, pers. com.). Successful reproduction over generations has not been demonstrated for the other basins as yet. A summary of recent redd count data and spawner composition is provided in Table 10. All three of the existing

UCR spring chinook salmon naturally reproducing populations have exhibited similar downward trends and patterns in abundance over the past 40 years (NMFS 2003c, 2003d, 2003e). Assuming that population growth rates were to continue at 1980-2000 levels, UCR spring chinook salmon populations are projected to have very high probabilities of 90 percent decline within 50 years (87 to 100 percent). Redd counts in the three basins have improved in recent years, largely because of natural spawning by artificially propagated spring chinook salmon (Grassell 2003; Grassell 2004; Mosey and Murphy 2002; Hamstreet and Carie 2004; Humling and Snow 2004). Artificially propagated juvenile spring chinook salmon are released into the Chiwawa River with the expectation that as adults they will return and spawn in the Chiwawa River. In reality, these hatchery released fish have contributed an average of 50 percent of the spawners in the Chiwawa River and an average of 25 percent of the spawners in Nason Creek (Andrew Murdoch, WDFW, pers. com.). The propagation program spring chinook salmon that return to spawn in Nason Creek are considered strays and of potential adverse risk to the Nason Creek component of the population; measures to improve the fidelity of hatchery reared spring chinook salmon to the Chiwawa River are being explored. Additionally, a new artificial propagation program that releases locally derived juveniles into Nason Creek is likely to occur within the next five years. The reproductive effectiveness of these hatchery-origin salmon is not known at this time. However, preliminary indications in the Wenatchee River Basin suggest that the Chiwawa spring chinook salmon program is contributing to natural reproduction in successive generations (Andrew Murdoch, WDFW, pers. com.). Successful reproduction over generations has not been demonstrated for the other basins as yet.

While some improvement can be seen in recent years, the ESU is still at critically low levels compared to both historic production and the desired escapement levels—particularly for natural fish. Therefore, while there is some cause for guarded optimism, NMFS finds that there has been no genuine change in the species' status since they were listed as endangered, and the biological requirements are not being met with respect to abundance, distribution, or overall trend.

Provide the most recent 12-year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

UCR Spring Chinook:
The NRR for the Wenatchee, Entiat, and Methow populations has ranged from 1.4 to 0.4 from 1958 to 1995 broodyears. The NRR has not been above 1.0 since the mid-1970's for the Wenatchee and Methow populations and the mid-1980's for the Entiat population (Ford et al., 2001). Even with planned increases in mainstem juvenile passage survival anticipated from the Habitat Conservation Plan, additional survival of 20 to 50% is necessary to achieve NRR greater than 1.0 (Cooney, 2000 Draft). UCR Spring Chinook are extinct in the Okanogan River basin.

UCR Steelhead: The Natural Return Ratios (NRR) or wild adult-to-adult survival rates for the Methow/Okanogan populations have been estimated as between 0.05 – 0.35 from 1975 to 1991. For the Wenatchee/Entiat populations, the NRR are estimated to have ranged from 0.1 – 0.9 during this same time (Ford et al., 2001). The Biological Requirements Committee concluded that the UCR steelhead populations are not able to sustain themselves naturally, but it is not clear if they would go extinct without ongoing supplementation. The uncertainty surrounding the reproductive success of hatchery steelhead confounds these analyses. Even with planned increases in mainstem juvenile passage survival anticipated from the Habitat Conservation Plan, additional survival of 20 to 50% is necessary to achieve NRR greater than 1.0 (Cooney, 2000 Draft).

In areas above Priest Rapids Dam, several methods have been used to estimate the number of steelhead spawners and juveniles that the available habitat may be capable of supporting. These estimates for the UCR basin range from 1,603 to 8,281 depending on the estimation method (Ford *et*

al. 2001). The Interior Columbia Basin Technical Recovery Team (TRT) is reviewing the available data and is expected to provide escapement recommendations for recovery of all ESA-listed UCR species. The WDFW proposes to manage artificially propagated steelhead at levels above the interim abundance targets developed by NMFS (Lohn 2002) until the TRT recommendations are available. NMFS has not developed abundance targets for the Okanogan basin or other smaller tributaries.

Wild production -

The population status of listed steelhead smolts produced in the region has been estimated by WDFW (L. Brown, WDFW pers. comm). The number of steelhead juveniles that may be produced are indicated by the following subbasin production capacities for wild steelhead smolts in the region (WDF et al. 1993; MCMCP 1997):

- Wenatchee 62,167
- Entiat 12,739
- Methow 58,552
- Okanogan 17,570
- Total 151,028

Recent ten-year (1987-96) average seeding levels estimated for the region indicate potential wild smolt production at 109.5% of the modeled production capacities (MCMCP 1997):

- Wenatchee 73,371
- Entiat 10,728
- Methow 65,586
- Okanogan 15,660
- Total 165,345

Provide the most recent 12 year (e.g. 1988-present) annual spawning abundance estimates, or any other abundance information. Indicate source of these data.

UCR Steelhead:

Table 6. Upper Columbia River steelhead run composition at Wells Dam (Methow and Okanogan basins) (Letter from Kirk Truscott, WDFW, July 9, 2003).

	Artificially Propagated		Naturally Produced		
Year	Number	Percent	Number	Percent	Total Run
1998	2,849	92%	234	8%	3,083
1999	3,511	89%	447	11%	3,958
2000	6,142	92%	541	8%	6,683
2001	18,034	95%	889	5%	18,923
2002	9,098	93%	706	7%	9,804

Wenatchee and Entiat Rivers

Between 1967 and 2003, an average of 761 naturally produced steelhead spawned in the Wenatchee River (range; 70-2,864). In the Entiat River, spawning escapement has ranged from 9 to 366, averaging 97 fish. The 12-year geometric mean of spawners in the Wenatchee River has ranged from 185 to 919, and is currently (2003) 716 (Table 8). For the Entiat River, the 12-year geometric mean has ranged from 24 to 118 and is currently 92. The returning number of fish to both tributaries is auto-correlated since they were derived from the same aggregate. Therefore, the return per spawner is reported for both populations combined. In the Wenatchee and Entiat rivers, the return per spawner

has averaged 1.42 (range; 0.13-4.73) if hatchery fish produce the equivalent number of returning spawners as naturally produced fish, and averages 0.28 (range; 0.05-0.79) if hatchery fish do not produce any returning spawners. The 12-year geometric mean of the return per spawner has averaged 1.22 (range 0.71-1.96) if hatchery fish are equivalents to naturally produced fish, or 0.26 (0.18-0.32) if they do not contribute (Table 7).

Table 7. Summary statistics for determining naturally produced (NP) steelhead escapement and run reconstruction for the Wenatchee and Entiat Rivers

	Stlhd. Passed	% NP	NP Escapement		NP escpmt.		GEO-M NP escpmt.		Returns		Return per spawner for Wenatchee and Entiat			
				> harvest & presp.									GEO-M	GEO-M
	(RI-WLS)	Wen., Ent.	<hrvst.	mortality	Wen.	Ent.	Wen.	Ent.	Wen.	Ent.	H. eff. = 0	effect. = 1	H. eff. = 0	H. eff. = 1
1984	8,464	0.17	1463	919	683	87	220	28	1883	241	2.76	0.43	1.96	0.32
1985	12,132	0.21	2515	1859	1382	177	257	33	1406	180	1.02	0.19	1.91	0.32
1986	9,582	0.21	1967	1770	1315	168	323	41	1011	129	0.77	0.20	1.66	0.30
1987	7,239	0.41	2980	2682	1993	255	416	53	723	92	0.36	0.16	1.40	0.28
1988	4,840	0.33	1588	1430	1062	136	482	62	1125	144	1.06	0.36	1.37	0.29
1989	4,751	0.53	2507	2256	1676	214	538	69	536	69	0.32	0.18	1.31	0.30
1990	3,131	0.28	888	800	594	76	604	77	524	67	0.88	0.26	1.22	0.29
1991	3,176	0.49	1550	1395	1036	133	669	86	432	55	0.42	0.26	1.08	0.29
1992	5,451	0.23	1241	1117	830	106	761	97	485	62	0.58	0.15	0.90	0.25
1993	2,335	0.32	759	683	507	65	784	100	437	56	0.86	0.28	0.81	0.23
1994	3,457	0.20	704	634	471	60	919	118	301	39	0.64	0.13	0.79	0.22
1995	3,233	0.31	1006	906	673	86	919	117	369	47	0.55	0.18	0.71	0.22
1996	3,177	0.19	588	529	393	50	877	112	1111	142	2.82	0.56	0.71	0.22
1997	3,619	0.17	614	552	410	52	793	101	1941	248	4.73	0.74	0.81	0.25
1998	1,979	0.21	408	367	273	35	696	89						
1999	2,765	0.24	663	597	443	57	614	78						
2000	4,236	0.42	1789	1610	1196	153	620	79						
2001	10,084	0.42	4284	3855	2864	366	648	83						
2002	5,817	0.33	1931	1738	1291	165	691	88						
2003	17,481	0.28	2375	2137	1588	203	716	92						
Avg.:	**4,825**	**0.29**	**1,352**	**1,024**	**761**	**97**	**534**	**68**	**643**	**82**	**1.42**	**0.28**	**1.22**	**0.26**
Min.:	**1,305**	**0.14**	**196**	**94**	**70**	**9**	**185**	**24**	**110**	**14**	**0.13**	**0.05**	**0.71**	**0.18**
Max.:	**17,481**	**0.80**	**4,284**	**3,855**	**2,864**	**366**	**919**	**118**	**1,941**	**248**	**4.73**	**0.79**	**1.96**	**0.32**

RI-WLS Rock Island dam to Wells Dam; Wen = Wenatchee, Ent = Entiat; Stlhd = Steelhead; hrvst = harvest; escpmt = escapement; Geo-M = Geometric mean; H. eff = Hatchery Effective

Data from the Upper Columbia Salmon Recovery Plan June 2005 Draft.

UCR Spring Chinook

Table 8. Estimates of the number of natural-origin spring chinook returning to subbasins for each independent population of Upper Columbia River spring chinook salmon and preliminary Interim Recovery Abundance and Cautionary levels.

Year	Subbasin		
	Wenatchee River	Entiat River	Methow River
1979	1,154	241	554
1980	1,752	337	443
1981	1,740	302	408
1982	1,984	343	453
1983	3,610	296	747
1984	2,550	205	890
1985	4,939	297	1,035
1986	2,908	256	778
1987	2,003	120	1,497
1988	1,832	156	1,455
1989	1,503	54	1,217
1990	1,043	223	1,194
1991	604	62	586
1992	1,206	88	1,719
1993	1,127	265	1,496
1994	308	74	331
1995	50	6	33
1996	201	28	126
1997	422	69	247
1998	218	52	125
1999[1]	119	64	73
2000	*1,295*	*180*	*811*
1996-2000 average	451	79	276
Recovery Abundance	**3,750**	**500**	**2,000**
Cautionary Abundance	**1,200**	**150**	**750**

[1] Estimates for 1999 are preliminary; estimates for 2000 (italics) are based on the preseason forecast (actual return data not available 10/17/00).

Provide the most recent 12 year (e.g. 1988-present) estimates of annual proportions of direct hatchery origin and listed natural origin fish on the natural spwning grounds, if known. Indicate sources of these data.

UCR Steelhead:

See Table 6.

UCR Spring chinook:

Table 9. Annual total redd counts and proportion of artificially propagated to natural origin spring chinook salmon by tributary basin (Andrew Murdoch, WDFW, pers. comm.).

	Return Year								
Basin	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
				Redd Count					
Wenatchee Basin [a]									
Chiwawa River	82	13	23	82	39	34	128	1,046	
Nason Creek	27	7	33	55	29	8	100	367	
White River	3	2	12	15	5	1	8	93	
Entiat Basin	34	13	20	37	24	27	73	202	112
Methow Basin									
Twisp River	32	4	0	32	0	7	99	370	109
Chewuch River	27	2	0	55	0	6	20	1,037	301
Methow River	64	9	0	56	0	17	232	2,828	722
				Proportion of Hatchery to Natural Origin Spawners [b]					
Wenatchee Basin [a]									
Chiwawa River	0.40	0.05	0.43	0.70	0.56	0.33	0.56	0.74	
Nason Creek	0.23	0	0.33	0.63	0.19	0	0.24	0.61	
White River	0	0	0	0	0	0	0	0.21	
Entiat Basin [c]	0	0	0.20	??	0	0	0.58	0.25	0.18
Methow Basin									
Twisp River	0	0	0	0.25	0	0.64	0.96	0.33	027
Chewuch River	0.29	0	0	0.33	0	0.64	0.42	0.64	087
Methow River	.014	0	0	0.37	0	0.39	0.91	0.95	0.95

[a] *Areas upstream of Tumwater Dam*

[b] *Based on coded-wire tag recoveries*

[c] *Minimum values, some carcasses were of unknown origin*

2.2.3 Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take.

Activities approved through Section 10 Incidental Take Permit 1347 authorizes the WDFW, the Chelan PUD, the Douglas PUD annual incidental take of adult and juvenile, endangered, naturally produced and artificially propagated, UCR spring chinook salmon and UCR steelhead of ESA-listed species associated with the implementation of non-ESA-listed salmon artificial propagation programs in the UCR region. The programs are intended to supplement naturally spawned unlisted summer chinook salmon, fall chinook salmon, and sockeye salmon (*O. nerka*) production occurring upstream

from the vicinity of Priest Rapids Dam on the mainstem Columbia River, including the mainstem Columbia River and the Wenatchee, Methow, and Okanogan Rivers and their tributaries.

Unlisted salmon artificial propagation program activities will include:

- The collection of broodstock through trapping operations at: Wells Dam for Methow and Okanogan River summer chinook salmon populations, Wells Hatchery for summer chinook salmon releases from Wells and Turtle Rock hatcheries, Dryden and Tumwater Dams for Wenatchee River summer chinook salmon and Wenatchee sockeye salmon, and Priest Rapids Hatchery for Priest River hatchery-origin fall chinook salmon.
- The holding and artificial spawning of collected adults at Wells, Eastbank, and Priest Rapids Hatcheries, and Lake Wenatchee Net Pens.
- The incubation and propagation from the fertilized egg through the fingerling, pre-smolt or smolt life stage at the Wells, Eastbank, and Priest Rapids Hatchery complex facilities.
- The transfer of summer chinook salmon and sockeye salmon fingerlings or pre-smolts from the hatcheries for rearing at facilities in the Wenatchee, Methow, and Okanogan Rivers' watersheds, and to net-pens in Lake Wenatchee.
- The release of summer chinook salmon, fall chinook salmon, and sockeye salmon smolts into the Wenatchee, Methow, and Okanogan Rivers' basins, and into the mainstem Columbia River from the hatcheries, acclimation ponds, and net-pens on those systems.
- The monitoring and evaluation of these artificial propagation programs in the natural environment through activities such as redd counts and carcass surveys, and formal monitoring and evaluation plans to be developed by the HCP Hatchery Committees as called for in the HCPs.

Trapping Operations: The collection of summer chinook broodstock occurs at: Wells Dam for Methow and Okanogan River summer chinook salmon populations, Wells Hatchery for summer chinook salmon releases from Wells and Turtle Rock hatcheries, Dryden and Tumwater Dams for Wenatchee River summer chinook salmon and Wenatchee sockeye salmon, and Priest Rapids Hatchery for Priest River hatchery-origin fall chinook salmon. As run-of-the-river operations, the three summer chinook broodstock trapping programs may lead to the direct take of co-migrating listed species, including Upper Columbia River ESU steelhead, Upper Columbia River ESU spring chinook, and Columbia River population segment bull trout. Direct takes of these listed species at these traps are authorized through Section 10 direct take permits #1395 (steelhead) and # 1395 (spring chinook), and under a Section 6 cooperative management agreement with the USFWS (bull trout). Risk aversion measures associated with the trapping operations are detailed in WDFW permit applications for these authorizations and within the permits themselves. No other portions of the summer chinook program are expected to lead to the direct take of listed fish. The Wells Dam left and right bank ladder traps, and the Wells Hatchery trap, operate from early May through November to collect spring chinook, summer chinook, and steelhead broodstock. Water loss is not considered a risk factor for fish held in the traps, as the ladders are supplied with water passing through Wells Dam. The Dryden Dam traps will be in operation 7 days per week from July 1 through mid-November each year for summer chinook broodstock collection. Water loss is not a potential risk factor, as the ladders where the fish are trapped are supplied directly by the Wenatchee River at the head of Dryden Dam. The Tumwater Trap will be operated three days per week from early June through mid-November each year. The trap will be in active operation 16 hours per day during the three days per week that it will be open. Downstream migrating fish can pass the trapping operation freely. Frequent monitoring and operation of the trap minimizes the risk of fish loss. Water loss is not a potential risk factor, as the ladder where the fish are trapped is supplied directly by the Wenatchee River at the head of Tumwater Dam.

Genetic and Ecological Effects on Natural Populations: The Wenatchee summer chinook salmon program is designed to supplement the indigenous summer chinook salmon population in the

Wenatchee River and the release sites are well below the spring chinook salmon spawning and early rearing areas. Adult summer chinook salmon produced through the program will therefore contribute to the naturally spawning summer chinook salmon population. The risk of adverse competitive effects posed by progeny of hatchery-origin summer chinook salmon spawners to listed juvenile spring chinook salmon and steelhead is likely to be low, assuming resource partitioning between fish species that have evolved sympatrically in the Wenatchee River system and the spatial separation of the species. Fish species that evolved sympatrically in the UCR basin have developed slight differences in habitat use that tend to reduce opportunities for interaction, including competition for food resources, rearing space, and spawning areas.

The genetic risks to naturally produced populations from artificial propagation include reduction in the genetic variability (diversity) among and within populations, genetic drift, selection, and domestication which can contribute to a loss of fitness for the natural populations (Hard *et al.*1992; Cuenco *et al.* 1993; NRC 1996; and Waples 1996). Disease interactions between hatchery fish and listed fish in the natural environment may be a source of pathogen transmission. Because the pathogens responsible for diseases are present in both hatchery and natural-origin populations, there is some uncertainty associated with determining the extent of disease transmission from hatchery fish (Williams and Amend 1976; Håstein and Lindstad 1991). To address concerns of potential disease transmission from hatchery to natural fish, the Pacific Northwest Fish Health Protection Committee (PNFHPC) has established guidelines to ensure hatchery fish are released in good condition, thus minimizing impacts to natural fish (PNFHPC 1989). Also, the IHOT (1995) developed detailed hatchery practices and operations designed to prevent the introduction and/or spread of any fish diseases with the Columbia River Basin. Direct competition for food and space between hatchery and listed fish may occur in spawning and/or rearing areas, the migration corridor, and ocean habitat. These impacts are assumed to be greatest in the spawning and nursery areas and at points of highest fish density (release areas) and to diminish as hatchery smolts disperse (USFWS 1994). Competition for space and cover in the Methow and Ojkanogan River probably occurs between hatchery and natural fish shortly after release and during downstream migration, but based on the smolt travel times the duration of interaction is minimal in the river (WDFW 1998a). Rearing and release strategies at all WDFW salmon and steelhead hatcheries are designed to limit adverse ecological interactions through minimizing the duration of interaction between newly liberated hatchery salmon and steelhead and naturally produced fish.

Competition, predation, cannibalism, and residualism:

Direct competition for food and space between hatchery and natural fish may occur in spawning and/or rearing areas, the migration corridor, and in ocean habitat. These impacts are assumed to be greatest in the spawning and nursery areas and at points of highest fish density (release areas) and to diminish as hatchery smolts disperse (USFWS 1994). Competition continues to occur at some unknown, but probably lower, level as smolts move downstream through the migration corridor (NMFS 1995). Release of large numbers of pre-smolts in a small area is believed to have greater potential for competitive effects because of the extended period of interaction between hatchery fish and natural fish. Release of hatchery smolts that are physiologically ready to migrate is expected to minimize competitive interactions as they should quickly migrate out of the spawning and rearing areas. Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size such that smoltification occurs within nearly the entire population, which reduces retention time in the streams after release (Bugert et al. 1991). Rearing on parent river water, or acclimation for several weeks to parent river water, also contributes to the smoltification process and reduced retention time in the streams. Adult hatchery fish that stray to natural spawning areas, rather than return to the hatchery, may also be competing for spawning gravel. However, when spawning populations are at depressed levels, the degree of this impact should be small: there is thought to be a relationship between high

spawner density and greater egg loss in the natural environment (Chebanov 1991). Stray hatchery adults may also breed with native fish, potentially altering genetic fitness and influencing their ability to survive in the ecosystem . Hatchery fish may prey upon natural fish. Due to their location, size, and time of emergence, newly emerged chinook salmon fry are likely to be the most vulnerable to predation by hatchery released fish. Their vulnerability is believed to be greatest as they emerge and decreases somewhat as they move into shallow, shoreline areas (USFWS 1994). migration out of hatchery release areas and foraging inefficiency of newly released hatchery smolts may minimize the degree of predation on chinook salmon fry (USFWS 1994). Rearing and acclimation pond management strategies in the Mid-Columbia Hatchery Program will be designed to reduce impacts to natural fish. Predation by hatchery fish on natural-origin smolts is less likely to occur than predation on fry. USFWS (1994) presented information indicating salmonid predators are generally thought to prey on fish approximately 1/3 or less their length. Coho salmon and chinook salmon, after entering the marine environment, generally prey upon fish one-half their length or less and consume, on average, fish that is less than one-fifth their length (Brodeur 1991). Consequently, predation by hatchery fish on natural salmon and steelhead smolts in the migration corridor is believed to be low. In general, predation on natural fish may be reduced by using appropriate fish cultural practices. Hatchery fish may prey upon listed fish. Due to their location, size, and time of emergence, newly emerged Chinook salmon fry are likely to be most vulnerable to predation by hatchery released fish. Their vulnerability is believed to be greatest as they emerge and decreases somewhat as they move into shallow, shoreline areas (USFWS 1994). Emigration out of hatchery release areas and foraging inefficiency of newly released hatchery smolts may minimize the degree of predation on Chinook salmon fry (USFWS 1994). Hatchery salmonids that do not emigrate after release are said to have residualized. These fish that residualize can adversely affect naturally produced fish through competition and predation. Chinook salmon though do not tend to residualize (Groot and Margolis 1991).

Monitoring:

Associated monitoring Activities:
The monitoring and evaluation of these artificial propagation programs in the natural environment through activities such as redd counts and carcass surveys, and formal monitoring and evaluation plans are to be developed by the HCP Hatchery Committees as called for in the HCPs. WDFW as per permit conditions will be submitting annual reports that will detail these activities.

Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

Take Description and Levels are covered under Incidental Take Permit 1347 (artificial propagation of unlisted salmon). Incidental takes of ESA-listed species associated with broodstock collection activities, hatchery operations, and juvenile fish releases from the program are authorized.

Hatchery activities are covered under Incidental take Permit 1347 for unlisted salmon propagation program activities including:

- The collection of broodstock through trapping operations at: Wells Dam for Methow and Okanogan River summer chinook salmon populations, Wells Hatchery for summer chinook salmon releases from Wells and Turtle Rock hatcheries, Dryden and Tumwater Dams for Wenatchee River summer chinook salmon and Wenatchee sockeye salmon, and Priest Rapids Hatchery for Priest River hatchery-origin fall chinook salmon.
- The holding and artificial spawning of collected adults at Wells, Eastbank, and Priest Rapids Hatcheries, and Lake Wenatchee Net Pens.
- The incubation and propagation from the fertilized egg through the fingerling, pre-smolt or smolt life stage at the Wells, Eastbank, and Priest Rapids Hatchery complex facilities.

- The transfer of summer chinook salmon and sockeye salmon fingerlings or pre-smolts from the hatcheries for rearing at facilities in the Wenatchee, Methow, and Okanogan Rivers' watersheds, and to net-pens in Lake Wenatchee.
- The release of summer chinook salmon, fall chinook salmon, and sockeye salmon smolts into the Wenatchee, Methow, and Okanogan Rivers' basins, and into the mainstem Columbia River from the hatcheries, acclimation ponds, and net-pens on those systems.
- The monitoring and evaluation of these artificial propagation programs in the natural environment through activities such as redd counts and carcass surveys, and formal monitoring and evaluation plans to be developed by the HCP Hatchery Committees as called for in the HCPs

Because of the inherent biological attributes of aquatic species, such as salmon and steelhead, the dimensions and variability of the Columbia River system and tributaries, and the operational complexities of hatchery actions, determining precise incidental take levels of ESA-listed species attributable to the hatchery activities is not possible at present. The existence of concurrent WDFW broodstock collection programs for listed steelhead at Wells Dam, Dryden Dam, and Tumwater Dam (previously authorized by NMFS through Section 10 direct take Permit 1395), and for listed spring chinook salmon at Tumwater Dam (previously authorized by NMFS through Section 10 direct take Permit 1196), further complicates the ability to identify incidental take occurring through the unlisted salmon programs. Indirect takes from hatchery releases such as predation and competition is highly uncertain and dependant on a multitude of factors (i.e. data for population parameters - abundance, productivity and intra species competition) and although HGMPs discuss our current understanding of these effects, it is not feasible to determine indirect take (genetic introgression, density effects, disease, competition, predation) due to these activities. Estimated annual levels of take or take tables for these activities cannot be submitted with this document.

Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.
Any additional mortality from this operation that deviates from permit conditions or take levels would be communicated to NOAA Fisheries per permit conditions (#1347).

Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.
Annual Progress Reports as a condition of Section 10 permit compliance are provided from WDFW to NOAA Fisheries for past takes associated with the Section 10 permit (#1347).

Section 3: Relationship of Program to Other Management Objectives

3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the *NPPC Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

A comprehensive ESU-wide plan for the propagation of UCR summer/fall Chinook does not exist. Fishery co-managers have prepared a draft "Biological Assessment and Management Plan, Mid-Columbia River Hatchery Program" (Bugert 1998). This conceptual artificial production plan (BAMP) was developed as a component of a Mid-Columbia Habitat Conservation Plan, but has not yet been formally agreed upon and adopted. Production increases are to be consistent with conservation of low risk, natural populations and recovery of listed species. A phased approach is to be used to minimize deleterious effects of collecting broodstocks upon natural populations and to allow monitoring of program development.

The summer chinook production programs are fully consistent with standards and guidelines set forth in the MCMCP's "Mid-Columbia Hatchery Plan" (BAMP 1998). The plan presents hatchery programs that have been jointly developed and, in most cases, agreed to by the parties to the MCMCP, which includes WDFW, NMFS, USFWS, Chelan and Douglas PUDs, and the Tribes.

The summer chinook artificial propagation program is a component of the Mid-Columbia Hatchery Program, a part of an application for a 50-year multi-species Habitat Conservation Plan (HCP) and relicensing agreement for the PUDs. This plan has two objectives: (1) to help recover natural populations throughout the Mid-Columbia Region so that they can be self-sustaining and harvestable, while maintaining their genetic and ecologic integrity; and (2) to compensate for a 7% mortality rate at each of the five PUD-owned mid-Columbia River mainstem dams (Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids) in a manner that is consistent with the first objective. Through the regional hatchery plan, the summer chinook artificial production program has been integrated with harvest management objectives to provide run size enhancement and fishery benefits. Biological risks to listed species in the Columbia Basin posed by hatchery chinook releases, including predation, competition, and disease transfer, are expected to be minimal.

The program described in this HGMP is consistent with the following general agreements and plans:

- The Columbia River Fish Management Plan (CRFMP)
- *U.S. vs. Oregon* court decision
- Production Advisory Committee (PAC)
- Technical Advisory Committee (TAC)
- Integrated Hatchery Operations Team (IHOT) Operation Plan 1995 Volume III.
- Pacific Northwest Fish Health Protection Committee (PNFHPC)
- In-River Agreements: State, Federal, and Tribal representatives
- Northwest Power Planning Council Sub Basin Plans
- Washington Department of Fish and Wildlife (WDFW) Wild Salmonid Policy
- WDFW's Yearly Future Brood Document (FBD)

3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

In 1988, under the authority of U.S. v. Oregon, the states of Washington, Oregon and Idaho, federal fishery agencies, and the treaty tribes agreed to the Columbia River Fish Management Plan

(CRFMP), which was a detailed harvest and fish production process. There are no financial encumbrances tied to the process. Rather, the fish production section reflects current production levels for harvest management and recovery purposes, since up to 90% of the Columbia River harvest occurs on artificially produced fish. This Plan expired in 1998, and has had subsequent annual rollover of portions in which agreement has been reached. However, a newly negotiated CRFMP is forthcoming. Hatchery production programs in the upper Columbia sub-basins are included in the management plans created by the fishery co-managers identified in the treaty fishing rights case *United States v Oregon*. The parties to *U.S. v Oregon* include the four Columbia River Treaty Tribes – Yakama Nation, Warm Springs, Umatilla, and Nez Perce tribes, NOAA-Fisheries, U.S. Fish and Wildlife Service, and the states of Oregon, Washington, and Idaho. The Shoshone-Bannock Tribe is admitted as a party for purposes of production and harvest in the upper Snake River only. These parties jointly develop harvest sharing and hatchery management plans that are entered as orders of the court that are binding on the parties. The "relevant co-managers" described in the *U.S. v Orego*n management plans are, for the mid-Columbia sub-basins, the federal parties, Yakama Nation, and Washington Department of Fish and Wildlife.

Artificial production in the Columbia Cascade Province has been primarily driven by mitigation agreements with Douglas County, Chelan County, and Grant County Public Utility Districts, and the Grand Coulee Mitigation Agreement of the U.S. Bureau of Reclamation. The Columbia River Fish Management Plan arising from the US v. Oregon process includes hatchery programs, but this plan has expired and is no longer in force.

In April 2002, negotiations on three Habitat Conservation Plans (HCPs) were concluded pursuant to section 10(a)(1)(B) of the ESA; *Anadromous Fish Agreement and Habitat Conservation Plan Wells Hydroelectric Project FERC1 License No. 2149* with Douglas PUD for the operation of Wells Dam (DPUD 2002), and *Anadromous Fish Agreement and Habitat Conservation Plan Rocky Reach Hydroelectric Project FERC License No. 2145* (CPUD 2002a) with Chelan PUD for the operation of Rocky Reach Dam, and *Anadromous Fish Agreement and Habitat Conservation Plan Rock Island Hydroelectric Project FERC License No. 943* with Chelan PUD for the operation of Rock Island Dam (CPUD 2002b). Biological Opinions with incidental take statements (ITSs) on the operation of each of the above hydroprojects have been issued consistent with the HCPs (NMFS 2003a, 2003b, 2003c).

The supplementation program, and the HGMP describing it, are consistent with the following agreements or plans:

- The Mid-Columbia Mainstem Conservation Plan - Hatchery Plan (BAMP 1998).
- The Rock Island Settlement Agreement (RISA 1989) between Chelan Public Utilities District, their power purchasers, and the joint fishery parties represented by Washington Department of fish and Wildlife and other state and federal fishery agencies and tribes.
- The Wells Settlement Agreement between Douglas PUD, their power purchasers, and the joint fishery parties represented by Washington Department of fish and Wildlife and other state and federal fishery agencies and tribes.
- The Rocky Reach Mitigation Agreement between the joint fishery parties and Chelan PUD, as modified in the late-1980s.

3.3 Relationship to harvest objectives.

Through the regional hatchery plan, the summer chinook artificial production program has been integrated with harvest management objectives to provide run size enhancement and fishery benefits. The summer chinook propagation program is a component of the Mid-Columbia Hatchery Program, a part of an application for a 50-year multi-species Habitat Conservation Plan (HCP) and relicensing agreement for the PUDs. This plan has two objectives: (1) to help recover natural populations throughout the Mid-Columbia Region so that they can be self-sustaining and harvestable, while

maintaining their genetic and ecologic integrity; and (2) to compensate for a 7% mortality rate at each of the five PUD-owned mid-Columbia River mainstem dams (Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids) in a manner that is consistent with the first objective. Through the regional hatchery plan, the summer chinook artificial production program has been integrated with harvest management objectives to provide run size enhancement and fishery benefits. Biological risks to listed species in the Columbia Basin posed by hatchery chinook releases, including predation, competition, and disease transfer, are expected to be minimal.

Summer chinook from the region are only harvested incidentally in lower Columbia River fisheries directed at other species, and no directed commercial fisheries on upper Columbia summer-run fish have occurred in the mainstem since 1964 (BAMP 1998). Ceremonial and subsistence fisheries by the Colville Tribe in waters upstream of Rock Island Dam (mainly at the base of Chief Joseph Dam) harvest an average of 800 adults each year (1987-92 data from Chapman and al. 1994). The 1982-89 brood year average ocean fisheries exploitation rate is 39 %, with a total exploitation rate of 68 % estimated for the same years (Myers et al. 1998). Estimation of recent, past harvest rates for summer chinook originating in the region is complicated by changes in timing of the adult return of the Wells Hatchery group. As a consequence, Chapman et al. (1994) used only one brood year (1977) as the base for estimating preterminal exploitation rates for all subsequent brood years. The recent past (1975-87) mean exploitation rate for Wells Hatchery-origin summer chinook was estimated by Chapman et al (1994) to be about 40 %. Given fishery protection measures implemented in preterminal area, mainstem Columbia River and upper river tributaries to protect ESA-listed and depressed salmonid populations, future harvest rates on fish propagated by the program and on natural populations in the target area are expected to be lower than the mean level (40 %) estimated for the 1975-87 period.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

The fisheries benefiting from this program will include:
1) Ocean recreational and commercial fisheries from the mouth of the Columbia River north to S.E. Alaska
2) Columbia River Zone 1-5 commercial fishery
3) Columbia River Zone 1-6 recreational fishery
4) Columbia River Zone 6 tribal C&S and commercial fisheries
5) Mid-Columbia River recreational fisheries

Early-arriving summer/fall Chinook from the mid-Columbia region have been heavily exploited in ocean fisheries, but only incidentally harvested in the lower Columbia River.

Wenatchee Summer Chinook Fisheries Contributions

Brood Year	Program Release #	# of Fish Program Contributed to Fisheries	Proportion (%) of Total Catch								
			AK and Can. Commercial	OR, WA, WA treaty Troll	Col. R. Gillnet	AK and Can. Ocean Sport	WA Ocean Sport*	OR Ocean Sport	Fresh-water Sport**	Treaty C&S	Misc. Fishery Contribution (<1%)
1991	191,179	48	36.0	5.1	0.0	20.5	0.0	0.0	38.4	0.0	0.0
1992	627,331	188	59.5	14.3	0.0	2.3	0.0	0.0	0.0	21.8	2.1
1993	900,429	287	34.2	3.7	0.0	24.9	0.0	0.0	0.0	37.2	0.0
1994	797,350	1,166	61.6	5.0	1.2	19.6	0.0	0.0	0.0	8.5	4.1
1995	687,439	520	65.2	12.5	2.1	16.6	0.0	0.0	0.0	0.0	3.6
1996	600,127	194	65.2	9.5	1.6	16.4	2.3	1.2	3.3	0.0	0.5

1997	408,223	3,145	67.5	12.7	0.0	10.0	2.6	0.0	3.3	0.0	3.9
1998	649,612	5,240	61.2	15.8	1.9	10.3	4.7	1.5	2.9	0.0	1.7
1999	1,005,554	1,687	60.4	15.7	7.8	8.1	2.3	0.0	3.1	0.0	2.6
Average	651,916	1,386	56.8	10.5	1.6	14.3	1.3	0.3	5.7	7.5	2.1
***Contains WA Buoy 10 fisheries. ** Combined WA and OR Columbia River and Col. R. Tributaries.**											

Source: WDFW and RMIS.

3.4 Relationship to habitat protection and recovery strategies.

Summer chinook salmon in the mid-Columbia Region are among the most electrophoretically homogenous populations in the state (BAMP 1998). The diversity of habitat they use however, is quite high. One goal of the summer chinook hatchery programs is to develop local adaptation to streams in the Mid-Columbia Region. Production methods are implemented that encourage local adaptation to the various habitats within the region while minimizing negative effects on natural fish populations. One goal of the Mid-Columbia Habitat Program is to protect and restore critical habitats for salmon and steelhead within the Mid-Columbia Region (Bugert et al. 1997). The Mid-Columbia Hatchery Program? (BAMP 1998) on which the summer chinook release programs are based will therefore work in concert with that program. The main fresh-water habitat problem presently facing this ESU is presence of hydropower dams in the mainstem Columbia River, which have probably reduced returns of chinook salmon (Chapman et al. 1994). Measures taken by the Mid-Columbia PUDs to improve natural production of anadromous fish in the region will compensate for mortality in project and reservoir passage. Two strategies will be used: (1) habitat protection and restoration, and (2) hatchery production of affected species in the mainstem mid-Columbia River and in the four major tributaries (BAMP 1998).

Habitat protection efforts, combined with production from the summer chinook hatchery programs, are expected to benefit natural summer chinook production over the short-term and long- term. Improvements in dam passage survival rates, and improvements in smolt to adult survival rates afforded by the summer chinook programs will be used to boost the upper river adult population to a level approaching 18,000 fish at Priest Rapids Dam and approaching 8,000 at Rocky Reach Dam (BAMP 1998).

WDFW is a cooperating agency involved in regional fish and wildlife planning and technical assistance effort through the Upper Columbia Salmon Recovery Board (UCSRB). The mission of the UCSRB is to restore viable and sustainable populations of salmon, steelhead, and other at-risk species through the collaborative, economically sensitive efforts, combined resources, and wise resource management of the Upper Columbia Region. Along with Chelan, Douglas, and Okanogan counties, the Yakama Nation, and Colville Confederated Tribe, local, state, and federal partners, agency staff will be working closely in partnership with existing planning efforts in the region including Wenatchee Watershed Planning, Entiat Watershed Planning, Lead Entities, Regional Fisheries Enhancement Group, and Salmon Recovery Planning.

Six fish and wildlife plans (also known as "subbasin plans") will be developed for the following "subbasins" (commonly known as watersheds): Wenatchee, Entiat, Lake Chelan, Methow, Okanogan, and the mainstem Columbia River from Rock Island dam to the Canadian border. Subbasin plans will be submitted to the Northwest Power Planning Council in May 2004. These subbasin plans will identify and provide the basis for prioritizing project proposals to be submitted to the Northwest Power Planning Council in future funding cycles and will be used, potentially, for salmon recovery planning in North Central Washington.

WDFW helps ensures that actions taken to protect and restore salmonid habitat in the region are based on sound scientific principles thru technical assistance of Regional staff. In addition to habitat, WDFW is involved with the Yakama Nation and Colville Confederated Tribes in helping develop

recovery goals, and providing coordination and representation for all 4 H's (Harvest, Hydro, Hatcheries and Habitat). At the watershed scale, technical tools such as Limiting Factors Analysis (LFA), Ecosystem Diagnosis and Treatment (EDT) and SSHIAP (Salmon and Steelhead Inventory and Assessment Program) will used to identify factors that currently impact salmon and the priority actions needed in the watershed.

3.5 Ecological interactions.

Salmonid and non-salmonid fishes or other species that could:

(1) negatively impact program;
Summer chinook smolts are released in the spring as either yearlings or sub-yearlings. Competition for food may play a role in the mortality of liberated summer chinook. SIWG (1984) indicated that there is a high risk that competition between hatchery-origin chinook, and coho, steelhead and other chinook stocks, will have a negative impact on the productivity of the hatchery fish. Predation in freshwater areas also may limit the productivity of the summer chinook releases. In particular, predation by northern pike minnow poses a high risk of significant negative impact on productivity of enhanced chinook (SIWG 1984). Predation risks to hatchery chinook juveniles posed by coho, steelhead, and other chinook stocks are unknown (SIWG 1984). Hatchery-reared salmon and steelhead released into spawning and rearing areas of natural species may fail to emigrate (residualize), and may negatively interact with natural fish. Steelhead residualism has been found to vary greatly, but is thought to average between 5% and 10% of the number of fish released (USFWS 1994). Because of their larger size, the predation risk posed by the above species is lower to yearling smolts released from the hatcheries (Rieman et al. 1991).

(2) be negatively impacted by program;
SIWG (1984) reported that there is a high risk that enhanced chinook salmon populations would negatively affect the productivity of wild chum and sockeye in freshwater and during early marine residence through predation. The risk of negative effects to wild fish posed by hatchery chinook through competition is low or unknown in freshwater and marine areas (SIWG 1984). Large concentrations of migrating hatchery fish may attract predators (birds, fish, and seals) and consequently contribute indirectly to predation of listed wild fish (Steward and Bjornn 1990). The presence of large numbers of hatchery fish may also alter wild salmonid behavioral patterns, potentially influencing their vulnerability and susceptibility to predation.

(3) positively impact program;
Increased numbers of chinook and other salmonid species that escape to spawn in upper Columbia River tributaries may contribute nutrients to the system upon dying that would benefit
summer chinook productivity.

(4) be positively impacted by program.
Summer chinook juveniles released through the WDFW programs may benefit co-occurring salmonid populations. A mass of hatchery fish migrating through an area may overwhelm established predator populations, providing a beneficial, protective effect to co-occurring wild fish. Increased numbers of hatchery-origin summer chinook that are allowed to spawn naturally may contribute nutrients to the system upon dying that would benefit the productivity of other salmonid species.

Section 4. Water Source

4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile and natural limitations to production attributable to the water source.

The water supply for Dryden Pond for final rearing and acclimation (16 cfs) originates from an irrigation canal that takes water from the Wenatchee River at Dryden Dam. The intake is 1 km upstream of the pond. Ambient water temperatures in the Wenatchee River from fall through the April/May are optimal for rearing with the program released before the summer temperatures exceed 62ºF continually from June through mid-September.

Eastbank Hatchery has four wells that supply 53 cfs, from an aquifer, with a temperature range of 7.8 C in May to 13.9 C in December. The incubation room can produce 315 gpm of chilled water for incubation. The quality of water used by the hatcheries is high, and adequate to ensure the health of salmonids propagated. Fish reared at these hatcheries are transferred to other hatcheries (Turtle Rock) or acclimation ponds (Similkameen, Carlton, Dryden) for rearing to smolt size and release. Turtle Rock is supplied with 44 cfs of Columbia River water pumped directly from the reservoir behind Rocky Reach Dam. The rearing/acclimation ponds are supplied with river water at each site (Dryden - 16 cfs, Similkameen – 21 cfs, and Carlton - 15 cfs) and there are no differences between the water used for these latter portions of the summer chinook programs and water used by the naturally spawned populations.

4.2 Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Adverse impacts on listed fish due to the operation of hatchery facilities for the propagation of unlisted species may occur because of river water intake placement, or design, or operation including blocked migration, de-watering river reaches or reduced stream flow, and entrainment from unscreened or improperly screened intakes. Effluent from hatchery facilities may decrease quality through changes in water temperature, pH, suspended solids, ammonia, organic nitrogen, total phosphorus, and chemical oxygen demand in the receiving streams mixing zone (Kendra 1991). Water withdrawal for use in hatcheries is monitored through the Washington State Department of Ecology and the Washington State chapter 90.03 Revised Code of Washington (RCW) water code. None of the hatchery facilities employed to carry out the proposed artificial propagation programs de-water river reaches used by listed fish for migration, spawning, or rearing.

In the mainstem Columbia River, Eastbank Hatchery does not use any surface water, so no intake structures are associated with these operations, and no intake screening that may lead to listed juvenile fish injury through entrainment exists. Juvenile fish screening for the water intake systems at Wells Hatchery and Priest Rapids Hatchery are not in compliance with NMFS screening criteria (NMFS 1996). The facilities were built prior to the establishment of NMFS criteria. Douglas PUD is committed to be in compliance by November 2005 (Shane Bickford, pers. com., October 1, 2003). Routine intake screen inspections and upgrading to current screening criteria when existing screens fail are conditions which will be included in permit 1347. Without these conditions, water intakes for the hatchery may adversely affect listed spring chinook and steelhead juveniles through entrainment. Application of the conditions to the operation of these hatcheries through this Opinion will help ensure that the effects of the hatchery intakes on listed fish are adequately minimized.

The applicants propose to operated and monitor their programs in compliance with applicable NPDES permit effluent discharge limitations. Each permit contains limits concerning discharge, monitoring and reporting requirements, and other provisions to ensure that the discharge does not hurt water quality or people's health. In essence, the permit translates general requirements of the Clean Water Act into specific provisions tailored to the specific hatchery facility operations and the

discharge of pollutants. Although the actual level of impact of hatchery effluent discharge on listed fish survival is unknown, it is presumed to be small and localized at outfall areas, as effluent is diluted downstream. This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE). WAG 13-5011. Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE.

Discharges from the cleaning treatment system are monitored as follows: *Total Suspended Solids (TSS)*C1 to 2 times per month on composite effluent, maximum effluent and influent samples. *Settleable Solids (SS)*C1 to 2 times per week on effluent and influent samples. *In-hatchery Water Temperature* - daily maximum and minimum readings.

*Appendix G2 lists design criteria for existing acclimation ponds on terminal area streams in the Mid-Columbia Region. These standards will be used for development of new sites for the Mid-Columbia Hatchery Program. Screening of hatchery intakes is critical to ensure that fish are not permanently removed from the stream. During Phase A all new hatchery intakes in the Mid-Columbia Hatchery Program will meet or exceed screening criteria established by WDFW. All facilities in the proposed Mid-Columbia Hatchery Program discharge hatchery effluent directly into the Columbia River or its tributaries. The existing facilities meet or exceed NPDES requirements, and dilution factors downstream of discharge points will have no affect on habitat quality affecting natural species. Total discharge for the facilities are: Wells FH - 83 cfs; Eastbank FH- 53 cfs; Rocky Reach- 35 cfs; Priest Rapids- 117 cfs. The targeted Columbia River discharge at Priest Rapids Dam during juvenile outmigration is 140 kcfs.

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	V-Type Trap/Weir with Holding Box - Dryden Dam Left Bank Ladder	546.0	10.5	8.0	6.5	U
1	V-Type Trap/Weir with Holding Box - Dryden Dam Right Bank Ladder	2800	10.0	40.0	7.0	U
1	Concrete Pond- Eastbank Hatchery	2120	58	9.75	3.75	500-550

Adult summer chinook used as broodstock are captured at Dryden and Tumwater dams on the Wenatchee River, which is the home water source for the target population. Adult capture traps are operated on the left and right banks of the Dryden Diversion Dam. The Tumwater Dam trap is situated at the top of the fish ladder circumventing Tumwater Dam on the left bank of the Wenatchee River. Fish are trapped through closure of a gate at the top of the trap, which prevents upstream passage, maintaining the fish in a 10' x 50' x 8' deep holding pond. The pond lacks a "V" entry, and fish are therefore not prevented from returning to downstream areas. The trap is actively run, with fish allowed to exit the pond upstream via a *Denil* ladder shunted into a 4' x 4' holding box for immediate loading into a tanker truck for transport to Eastbank hatchery. The fish may also be passed into the dam forebay in this manner. Collected fish will be identified by species and as of wild or hatchery-origin if visible marks enable such distinguishment.

Broodstock bound for the Methow and Okanogan basins are intercepted down-river at Wells Dam on the mainstem Columbia, prior to reaching the tributaries. Broodstock trapped at the Dam and volunteering into Wells Hatchery are held in adult holding ponds supplied with water fed from the reservoir. Captured adult fish, eggs, fry, and fingerling fish are held at Wells or Eastbank hatcheries, and reared at Eastbank Hatchery, Rocky Reach Hatchery, and Wells Hatchery. The latter three hatcheries rely on either well water (Eastbank and Wells), or water seeping below Rocky Reach Dam (Rocky Reach). Fish traps at Wells Dam are located in the ladders on both the east and west sides of the dam. Fish reaching the top of the west side ladder ascend a 12' *Denil* fish ladder into a 12' x 12' x 8' deep holding tank. Captured fish can then be directed from the holding tank over a false weir leading to a "V" shaped chute, which funnels the fish into an underground pipe leading to a 12' x 100' pond, where broodstock are held for spawning. Movement of fish in this manner is automatic, and no handling with nets, which could damage the fish, is involved. The left bank trap is comprised of a V-weir leading into a holding tank at the top of the fish passage ladder. The area of the trap where fish are held measures 10.5' long x 8' wide, with depth varying between 6'-7', depending on river flow. The right bank trap is situated at the base of the dam. A V-weir centered in one side of a 10' x 40' x 6'-8' deep is used to capture and hold fish. From this holding area, fish are either taken for use as broodstock or shunted into a *Denil* ladder for upstream passage. The trap will operate passively 24 hours per day that it is open, and it will be checked daily for captured fish. A *Denil* ladder in the trap will be operated up to three hours per day to ensure capturing trapped fish for inclusion in the broodstock. Summer chinook retained as broodstock will be held and spawned at Eastbank Hatchery.

5.2 Fish transportation equipment (description of pen, tank, truck, or container used).

Equip. Type	Capacity (gallons)	Supp. Oxygen (y/n)	Temp. Control (y/n)	Norm. Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Flatbed Truck with Tank (adult hauling-Dryden/Tumwater)	250	Y	N	35-45	MS 220 and NaCl	10 ppm (MS 220) and 0.5-1.0% (NaCl)
Tanker Truck (Juvenile/Smolt Hauling)	2500	Y	N	35	MS 220 and NaCl	5-1.0% (NaCl)

Adults are transferred from Wells, Dryden Diversion Dam or Tumwater Dam to Eastbank Hatchery for holding.

5.3 Broodstock holding and spawning facilities.

Summer chinook trapped at Tumwater Dam and Dryden Dam are transported to Eastbank Hatchery for holding to maturity and spawning. The fish are held in an adult holding pond. Summer chinook intercepted in the Wells Dam east ladder trap are immediately transported to Eastbank hatchery and held until maturity in an adult holding pond and spawned as a separate group from the Wenatchee summer chinook.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Concrete Pond- Eastbank Hatchery	2120	58	9.75	3.75	500-550

5.4 Incubation facilities.

Incubator Type	Units (number)	Flow (gpm)	Volume (cu.ft.)	Loading-Eyeing (eggs/unit)	Loading-Hatching (eggs/unit)
Heath Stacked Tray (104 half stack units with 7 trays per 1/2 Stack	104	4.5	-	6000	8000

The main hatchery, Eastbank, has 104 half-stacks of vertical incubators equipped with a chilled water supply (4.5 gpm per half-stack),

5.5 Rearing facilities.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
2	Concrete Standard Raceways-Eastbank Hatchery	3760	100	10	3.76	900	-	0.125
3	Super-Racerways	22200	180	20	6.2	3500	-	0.125
1	Pond- Dryden Satellite Facility	115200	210	55	5.0	12000	-	0.125

Summer chinook fry are reared to fingerling size at Eastbank, Wells, and Rocky Reach hatcheries. The fish reared at Wells are released as yearlings and sub-yearlings. The fish reared at Eastbank (see above

for rearing structures used) are transferred as fingerlings in the fall for overwintering at Similkameen Pond, and in the late winter or early spring to Carlton Pond and Dryden Pond for continued rearing to yearling smolt size and spring release. Fish reared at Rocky Reach are transferred as fingerlings to Turtle Rock for continued rearing and release as either sub-yearling or yearling smolts.

5.6 Acclimation/release facilities.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
Eastbank Rearing								
2	Concrete Standard Raceways-Eastbank Hatchery	3760	100	10	3.76	900	nya	0.125
3	Super-Racerways	22200	180	20	6.2	3500	nya	0.125
Wenatchee River/Dryden Pond								
1	Dryden Pond Satellite Facility	115200	210	55	5.0	12000	nya	0.125
Similkameen River Pond								
1	Similkameen Pond							

5.7 Describe operational difficulties or disasters that led to significant fish mortality.

Eastbank Hatchery & Remote Satellites- Periodic significant losses have resulted from BKD outbreaks in some fish lots.

5.8 Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

Potential adverse impacts identified with the physical operation of hatchery facilities include impacts from water withdrawal, release of hatchery effluent and facilities failure (NMFS 1999a). Hatchery effluent may transport pathogens (disease) out of the hatchery and infect natural-origin fish. Aside from the potential impacts on water flow and quality, operational failures due to power/water loss, flooding, freezing, vandalism, predation and disease may result in catastrophic losses to rearing adults and juveniles.

Flow reductions, flooding and poor fish culture practices may all cause hatchery facility failure or the catastrophic loss of listed fish under propagation. To protect fish, all efforts should be made to ensure that the survival of fish held for broodstock at the hatchery facility be maximized. The applicants propose a variety of measures to address risks associated with operational failures, including:

- Protection of fish from vandalism and predation is provided by fencing, locks, and security lights at all hatchery facilities;
- Rapid response in the event of power and water loss or freezing is provided by a combination of staffing and automated alarm paging systems;
- Equipping hatchery facilities to ensure reliable power to provide water to rearing fish during power outages.

Section 6. Broodstock Origin and Identity

6.1 Source.

Summer chinook salmon returning to the region spawn primarily in the Wenatchee River, with smaller spawning populations in the Methow, Similkameen, and Okanogan rivers. Summer chinook adults enter freshwater from mid-June through late-August (Wenatchee and Methow stocks) or mid September (Okanogan population) (WDF and WDW 1993). Wenatchee and Methow summer chinook spawning begins in late September and ends in early to mid- November, with peak spawning in October (Chapman et al. 1994; WDF and WDW 1993). Okanogan summer chinook begin spawning about one week earlier than the Wenatchee and Methow fish, but exhibit the same end and peak spawn timings (Chapman et al. 1994). Summer/fall chinook typically spawn in the Wenatchee River between Rkm 1.7 and Rkm 90; in the Methow River between Rkm 3.3 and Rkm 86; in the Okanogan River between Rkm 24.2 - 129 and in the Similkameen River from Rkm 0 to 14.8 (Chapman et al. 1994). Broodstock used in the programs are collected from the run-at-large reaching Dryden and Tumwater dams on the Wenatchee system, the east ladder trap at Wells Dam, and the Wells Hatchery outfall trap on the mainstem Columbia River. These fish originated from Wenatchee River (Tumwater and Dryden traps) and Okanogan/Methow (Wells Dam traps) summer chinook populations of natural or hatchery-origin, and indigenous to those systems. Varying numbers of natural summer chinook salmon volunteer into Wells FH on an annual basis and are incorporated into the broodstock.

6.2.1 History.

Broodstock Source	Origin	Year(s) Used	
		Begin	End
Wells Hatchery Summer Chinook (Admixture of Natural and Hatchery)	N/H	1989	Present
Methow/Okanogan Summer Chinook	N/H	1996	Present

Summer chinook broodstock collected for the hatchery programs are the descendants of stock manipulations during the Grand Coulee Fish Maintenance Program and mainstem dam mitigation (Myers et al. 1998). These activities tended to homogenize extant summer chinook populations, and likely resulted in incorporation of fall-run fish into summer chinook runs under propagation. The percentage of non-indigenous stocks incorporated into the hatchery programs has been low (about 3 % of the over 200 million ocean-type chinook propagated since 1941), and does not appear to have had a significant impact on the genetic integrity of the ESU (Chapman et al. 1994; Myers et al. 1998).

Propagation of summer/fall Chinook in the Columbia Cascade Province started with operation of the Wells spawning channel in 1967. Initially, the entire run was propagated. Then in 1987, broodstock collection was terminated after August 28th to avoid including stray fall Chinook from downriver programs. All broodstock came from local Columbia River summer/fall Chinook stock with few exceptions. Broodstock was diverted from ladders at Wells Dam or from volunteers that entered the trap at the hatchery discharge. Only low numbers, about 3%, of non-indigenous stocks have been incorporated into the broodstock over the years. Prior to 1987, summer/fall chinook were trapped from the west fish ladder at Wells Dam and were diverted into Wells Hatchery. Trapping took place from mid-July through early November (S. Bickford, pers comm. 2003).

Eastbank Hatchery - Broodstock supplying Eastbank's Wenatchee summer chinook program originate from indigenous fish returning to the Wenatchee River. Natural origin Wenatchee River summer chinook were trapped for the program beginning with the 1989 brood year. In accord with the Rock Island Settlement, the broodstock for the Similkameen and Carlton supplementation

programs is secured by trapping Methow/Okanogan stocks at the Wells Dam east ladder. By trapping only at the east ladder, most of the returning Wells hatchery stock is avoided.

Wells Hatchery - Since the initial operation of the spawning channel in 1967, broodstock collected for Wells Hatchery has come from fish diverted out of fish ladders while passing Wells Dam or from volunteers that enter the trap at the upper end of the hatchery discharge (Chapman et al. 1994). With the exception of undetected strays from other areas that may have contributed to the Wells broodstock collections, and the potential incorporation in some years (1967-86) of fall-run chinook, all broodstock for the Wells Hatchery program came from local Columbia River summer chinook stock (Chapman et al. 1994). Methow and Okanogan basin origin summer chinook were the major populations intercepted at Wells Dam, and supplying broodstock for the program.

6.2.2 Annual size.

The current annual program broodstock collection goals for the Eastbank hatchery's Wenatchee summer chinook supplementation programs is 492 equally divided by sex. Since founding the Wells summer chinook program from trapped Methow/Okanogan natural fish, there has been a transition to the use of mixed natural and hatchery-origin volunteer broodstocks at Wells Hatchery for the Wells and Rocky Reach mitigation programs. The collection goal of 1,048 summer chinook from the Wenatchee (492) and Methow/Okanogan (556) natural runs for use as broodstock is not expected to adversely affect the population status of the natural population relative to critical and viable thresholds.

Annual escapement of summer chinook salmon to Rock Island Dam averaged 15,640 adults and jacks (1983-92 data from Chapman 1994). Hatchery-origin adults are estimated to have contributed part of the escapement levels to the region, averaging about 6 % of the total escapement for the years 1967-87 (Chapman et al. 1995).

An escapement objective to basin tributaries above Wells Dam is 3,500; a level carried forth in the Mid-Columbia Hatchery Plan as a natural escapement goal (BAMP). A baseline adult production objective for the summer chinook salmon population reaching Rocky Reach Dam is 30,293 (BAMP 1998). The current annual program broodstock collection goals for the Eastbank hatchery?s Wenatchee and Methow/Okanogan summer chinook supplementation programs are 492 and 556, respectively, equally divided by sex.

Future production alternatives specified in the Mid-Columbia Hatchery Plan (BAMP 1998) will necessitate the annual collection of from 2,334 to 2,676 summer chinook (1:1 sex ratio), depending on the fate of the Rocky Reach/Turtle Rock program, to meet overall summer chinook smolt production objectives.

6.2.3 Past and proposed level of natural fish in the broodstock.

Broodstock used in the summer chinook supplementation programs are secured from the run-at large encountered through trapping in the Wenatchee River (at Tumwater and Dryden dams) and the mainstem Columbia River (Wells Dam and Wells Hatchery volunteers). There is currently no protocol in place to select either for or against any particular trait or parental origin in any of the summer chinook broodstock programs except that only Wells volunteers, which are a mix of hatchery and natural fish, are used for the Wells and Rocky Reach/Turtle Rock mitigation programs.

Broodstock collection Only unmarked salmon will be kept for broodstock. Some hatchery -origin salmon will be unmarked however, and may therefore be inadvertently collected. No effort will be made to remove unmarked hatchery salmon from the broodstock. Marked fish will be counted and passed upstream for natural spawning. This objective will require some changes in the right bank

fishway and steep pass. In all years, jacks (less than 55 cm fork length) will be collected in the same proportion they appear in the run at large. The current limit to Tumwater Dam collections (25% of total broodstock) will be maintained. This standard is to be based upon total number of fish collected, rather than the collection goal. Fish will be collected at Tumwater Dam no earlier than 16 July. Depending upon success of the Dryden Dam trap, and the stock profile analysis of the Wenatchee summer chinook salmon stock, trapping at Tumwater Dam may be phased out. To collect salmon throughout the assumed duration of the run, trapping will be broken into six periods, starting in July. Within each period, a maximum number of salmon may be collected at Dryden and Tumwater dams. These numbers are based upon an assumed distribution in run timing past Dryden Dam. They may be modified in season when more information is available. Collections in a given trap period can be made in as few days as possible, and will be decided by the Eastbank FH manager as the season progresses. The left bank trap at Dryden will not be used, unless the hatchery staff has difficulties in collection at the right bank trap. The following table sets the trap schedule:

Table 10. Trap Schedule on the Wenatchee River.

Trap Period	Dryden Dam	Tumwater Dam
5 July to 15 July	60	0
16 July to 31 July	170	60
1 August to 15 August	80	20
16 August to 31 August	25	0
1 September to 15 September	20	0
16 September to 15 October	18	0

Inflatable dam operations Operation of the inflatable dam will be kept at a minimum, to reduce potential impacts to salmon near Dryden Dam. Duration of the deflation period will be 24 hours or more. The dam will not be inflated more than once a week, to ensure a stable flow pattern exists. If enough salmon are collected to meet requirements for the given trap period (i.e., the target collection goal is met in one day), the hatchery crew will deflate the dam until the next trap period begins.

6.2.4 Genetic or ecological differences.

The broodstock chosen displays morphological and life history traits similar to the natural population. Broodstock is collected from the natural summer chinook population returning to the Wenatchee subbasin. There are no known genotypic, phenotypic, or behavioral differences between the hatchery stocks and natural stocks in the target area.

6.2.5 Reasons for choosing.

Summer chinook salmon propagated through the program represent the indigenous Wenatchee Basin and Methow/Okanogan populations, which are the target of the mitigation programs.

6.3 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

Operation of unlisted summer chinook salmon and sockeye salmon broodstock collection programs at Dryden and Tumwater Dams is not likely to lead to the capture and handling of listed spring

chinook salmon. The summer chinook salmon and sockeye salmon adults that are the targets of the trapping operations return to the Wenatchee River in July and August. It is unlikely that May-June migrating spring chinook salmon adults will be encountered in the trapping programs directed at these species. The WDFW delays operation of the Tumwater Dam trapping site until after July 15 as an additional measure to preclude takes of any late-arriving or delaying spring chinook salmon that may be present in Tumwater Canyon. Run-at-large broodstock collected at Tumwater and Dryden dams, and at Wells Dam and hatchery represent the indigenous upper Columbia river summer chinook populations. Differential CWT codes would allow for separation of Eastbank (Wenatchee), Wells, Carlton, and Similkameen hatchery-origin fish that volunteer to the Wells Hatchery trap. There are no known circumstances where a lack of data would lead to uncertainties about the choice of brood stock for this part of the program. The WDFW proposes to determine annual broodstock collection goals and protocols prior to the arrival of the adults each year to allow for consideration of run size, run composition in terms of sex, age, and natural to hatchery components. Broodstock collection protocols are generally as follows (BAMP 1998, with reference to annual co-manager review and approval of broodstock protocols):

- Retain predominately unmarked natural origin salmon for broodstock;
- Retain salmon throughout the duration of the run;
- Retain no more than 25 percent of the broodstock from Tumwater Dam;
- About 492 adult summer chinook salmon would be collected for broodstock;
- Follow established protocols for operation of the inflatable bladder at Dryden Dam;
- Operate the Dryden Dam right and left bank traps passively seven days per week and 24 hours per day during the trapping periods, which was between July 5 and November 17 in 2000 (WDFW 2000);
- Check traps daily and remove all captured fish;
- Fish not retained for broodstock will be released into the Wenatchee River, upstream from the collection site, utilizing water-to-water transfers;
- Operate the trap at Tumwater Dam actively three days each week for 8 hours each day between mid July and November;
- Delay operation of the Tumwater trap to collect salmon and steelhead broodstock is delayed until July to allow any late-arriving spring chinook salmon to clear the area;
- Open the Tumwater Dam trap open at night for unimpeded passage of migrating Wenatchee River salmonid populations, including listed steelhead.
- All summer chinook salmon yearlings released from Dryden Pond are marked with an adipose fin-clip/CWT combination for visual identification, and for monitoring and evaluation purposes.

Section 7. Broodstock Collection

7.1 Life-history stage to be collected (adults, eggs, or juveniles).

Adult summer chinook salmon are to be collected in the Wenatchee River for use as broodstock. The broodstock collection objective is to remove equal numbers of males and females.

7.2 Collection or sampling design

Wenatchee River Summer Chinook Salmon

Following are collection and sampling designs for the two trapping programs directed at summer chinook on the Wenatchee River. The 1989 - 1996 average proportion of the total return to the river collected as broodstock through these programs is 4.0 %.

- Collect predominately unmarked salmon for broodstock;
- Collect fish randomly from the run-at-large;
- Collect no more than 25 % of the broodstock from Tumwater Dam;
- Collect salmon throughout the duration of the run; and
- Follow past years' protocol for operation of the inflatable bladder at Dryden Dam.

Dryden Dam

Collect 492- wild origin chinook between 07 July and 12 September 2003. Up to 25% of brood (123 fish) may be taken at Tumwater Dam after 15 August. The 3- year old component will be limited to 10% of the broodstock collection. Broodstock will be held and spawned at Eastbank FH. The trap will passively collect summer chinook, 5 days/week and 24 hours/day, between 7 July and 12 September 2003. Summer chinook salmon broodstock are collected each year from the run at large reaching Dryden Dam, located at Rkm 25.8 on the Wenatchee River during the months of July and August. Chinook at Dryden, the main trapping location for the program in the river, are collected at one of two traps, located on each bank of the dam. An inflatable dam was built on the right bank sill of the dam to increase trap efficiency. When the dam is inflated, flow is displaced through the right and left fishways. The left bank trap is comprised of a V-weir leading into a holding tank at the top of the fish passage ladder. The area of the trap where fish are held measures 10.5' long x 8' wide, with depth varying between 6'-7', depending on river flow. The right bank trap is situated at the base of the dam. A V-weir centered in one side of a 10' x 40' x 6'-8' deep is used to capture and hold fish. From this holding area, fish are either taken for use as broodstock or shunted into a *Denil* ladder for upstream passage. The trap will operate passively 24 hours per day that it is open, and it will be checked daily for captured fish.

A *Denil* ladder in the trap will be operated up to three hours per day to ensure upstream passage of fish released from the trap. Summer chinook retained as broodstock in accordance with the above protocols will be held and spawned at Eastbank Hatchery. A low elevation drop at Dryden Dam allowing fish to bypass the fish ladders led to a low effectiveness in trapping broodstock in past years. Temporary modifications at Dryden Dam in 1992 were largely successful in increasing the number of fish trapped. Permanent modifications (inflatable bladder) were completed in the summer of 1992. When insufficient numbers of broodstock are captured at Dryden Dam, up to 25% of the needed broodstock can be trapped at Tumwater Dam. Unripe females are transported to Eastbank FH for holding and subsequent spawning. The fish are spawned at a 1 male to 1 female ratio; gametes of the least numerous sex are split into subsets and these are crossed with gametes from a different individual of the more numerous sex. Males are also live-spawned when necessary.

Tumwater Dam

Summer chinook salmon broodstock are also collected each year from the run at large reaching Tumwater Dam, located at Rkm 52.0 on the Wenatchee River during the months of July and August. Up to 123 summer chinook may be taken after 15 August to augment the Dryden summer chinook collection as necessary. The trap will actively collect summer chinook, 3- days/ week and 16- hours/day, between 15 August and 12 September 2002 as necessary to achieve 492 wild origin summer chinook (when combined with broodstock collection at Dryden Dam). Fish reaching Tumwater Dam are collected using a trap positioned at the top of the fish ladder, which is located on the left bank of the river. The trap will be operated three days per week during the sockeye and steelhead collection period each year. The trap will be in active operation 16 hours per day during the three days per week that it will be open. Fish are trapped through closure of a gate at the top of the trap, which prevents upstream passage, maintaining the fish in a 10' x 50' x 8' deep holding pond. The pond lacks a "V" entry, and fish are therefore not prevented from returning to downstream areas. The trap is actively run, with fish allowed to exit the pond upstream via a *Denil* ladder shunted into a 4' x 4' holding box for immediate loading into a tanker truck. The fish may also be passed into the dam forebay in this manner. Collected fish will be identified by species and as of wild or hatchery-origin. Summer chinook retained as broodstock in accordance with the above protocols will be held and spawned at Eastbank Hatchery. When operating, the Tumwater Dam trap is able to collect 100 % of the summer chinook migration arriving at Tumwater Falls. The chinook have no alternatives to bypass the dam other than the fish ladder. Broodstock collection protocols dictating that no more than 25 % of the annual goal of 492 fish be taken at Tumwater minimize removal levels at this location. For example, the estimated escapement to the Wenatchee River in 1993 was 8,364 summer chinook. The collection of approximately 123 fish (25 % of 492) would lead to the removal of 1.47 % of the total estimated run.

7.3 Identity.

These populations are included as part of the Upper Columbia Summer/Fall Chinook ESU (Myers et al. 1998). No other chinook population are present in the project area during the July-August broodstock collection period. Broodstock are collected from the run at large. Beginning with the 1993 brood, all summer chinook released from the Wells program have external marks (adipose clip and CWT), enabling recognition of adults upon return as of hatchery or natural origin. All yearling smolts produced by the Rocky Reach program (Turtle Rock) are adipose/CWT marked, while progress is being made toward marking all sub-yearlings (currently all "accelerated zero's are marked, but only 200,000 "normal" sub-yearlings are marked as a survival index group). All of the Wenatchee, Carlton, and Similkameen yearlings are adipose/CWT marked.

Summer chinook adults recruiting to the Wells Hatchery trap are a mixture of natural and hatchery-origin fish, and identified by CWT-adipose clip combinations. Gametes secured from these spawners are only used in the Wells Hatchery and Turtle Rock Hatchery release programs, and smolts are not released in areas above Wells Dam. Wild fish make up >30% (greater than thirty percent) % of the broodstock for this program.

7.4 Proposed number to be collected:

7.4.1 Program goal (assuming 1:1 sex ratio for adults: Broodstock collection facilities located at Dryden Dam and Tumwater Dam on the Wenatchee River collect up to 492 native Wenatchee River adult summer chinook between July and November each year for the program.

Annual escapement of summer chinook salmon to Rock Island Dam averaged 15,640 adults and jacks (1983-92 data from Chapman 1994). Hatchery-origin adults are estimated to have contributed part of the escapement levels to the region, averaging about 6 % of the total escapement for the years 1967-87 (Chapman et al. 1995). An escapement objective to basin tributaries above Wells Dam is 3,500; a

level carried forth in the Mid-Columbia Hatchery Plan as a natural escapement goal (BAMP). A baseline adult production objective for the summer chinook salmon population reaching Rocky Reach Dam is 30,293 (BAMP 1998). The current annual program broodstock collection goals for the Eastbank hatchery?s Wenatchee and Methow/Okanogan summer chinook supplementation programs are 492 and 556, respectively, equally divided by sex. Future production alternatives specified in the Mid-Columbia Hatchery Plan (BAMP 1998) will necessitate the annual collection of from 2,334 to 2,676 summer chinook (1:1 sex ratio), depending on the fate of the Rocky Reach/Turtle Rock program, to meet overall summer chinook smolt production objectives.

7.4.2 Broodstock collection levels for the last twelve years (e.g. 1990-2001), or for most recent years available.

Year	Adults		
	Females	Males	Jacks
Planned	246	246	5
1990	30	27	4
1991	60	44	1
1992	156	115	3
1993	219	230	1
1994	204	181	1
1995	216	162	1
1996	153	161	5
1997	108	105	5
1998	168	209	0
1999	247	228	3
2000	208	202	8
2001	152	194	0
2002	197	199	16
2003	171	173	0
2004	246	176	4
2005	-	-	-

7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.

In the event excess fish are collected, they will be returned to the Wenatchee River.

7.6 Fish transportation and holding methods.

Equipment Type	Capacity (gallons)	Supp. Oxygen (y/n)	Temp. Control (y/n)	Norm. Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)

Flatbed Truck with Tank (adult hauling-Dryden/Tumwater)	250	Y	N	35-45	MS 220 and NaCl	10 ppm (MS 220) and 0.5-1.0% (NaCl)
Tanker Truck (Juvenile/Smolt Hauling)	2500	Y	N	35	MS 220 and NaCl	5-1.0% (NaCl)

Summer chinook collected at Dryden and Tumwater dams are transferred to Eastbank hatchery and held in an adult holding pond at Eastbank Hatchery until spawned.

7.7 Describe fish health maintenance and sanitation procedures applied.

The Columbia River watershed is a single "Fish Health Management Zone" under the "Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State" (NWIFC and WDFW 1998), and transfers of salmon within the same zone are allowed from a fish disease management perspective. Regulated pathogens include bacterial kidney disease (BKD), which occurs routinely at virtually all of the facilities that rear chinook salmon, and the pathogen is ubiquitous in Columbia River basin chinook salmon populations, and infectious hematopoietic necrosis virus (IHNV), which has also been identified in adult chinook salmon returning to hatchery facilities in the UCR basin. North American viral hemorrhagic septicemia virus (VHSV) is also regulated, as is *Myxobolus cerebralis* (the protozoan causing whirling disease) which has not been found in the UCR basin. The proposed artificial propagation program will be operated to comply with these guidelines. In addition, fish health protocols will be followed in accordance with Pacific Northwest Fish Health Protection Committee (PNFHPC 1989) and Integrated Hatchery Operations Team (IHOT 1995) guidelines for all programs.

For all production programs under the Mid-Columbia Hatchery Program, standard fish health monitoring will be conducted (monthly checks of salmon and steelhead) by fish health specialist, with intensified efforts to monitor presence of specific pathogens that are known to occur in the donor populations (specific reactive and proactive strategies for disease control and prevention are outlined in Appendix I). Significant fish mortality to unknown cause(s) will be sampled for histopathological study. Fish health maintenance strategies are described in IHOT (1995). Incidence of viral pathogens in salmon and steelhead broodstock will be determined by sampling fish at spawning in accordance with the Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State. Populations of particular concern may be sampled at the 100% level and may require segregation of eggs/progeny in early incubation or rearing. Incidence of *Renibacterium salmoninarum* (Rs, causative agent of bacterial kidney disease) in salmon broodstock will also be determined by sampling fish at spawning. Where appropriate, collected broodstock will be sampled for enzyme-linked immunosorbent assay (ELISA). If required, hatchery staff will segregate eggs/progeny based on levels of Rs antigen, protecting "low/negative" progeny from the potential horizontal transmission of Rs bacteria from "high" progeny. Progeny of any segregation study will also be tested by ELISA; at a minimum each segregation group would be sampled at release. Necropsy based condition assessments (based on organosomatic indices) will be used to assess condition of hatchery reared salmon and steelhead smolts at release, and wild salmon and steelhead during out migration. If needed, condition assessments will be done at other key times during hatchery rearing.

Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection committee (PNFHPC), WDFW's Fish Health Manual November 1966, updated March 30, 1998 or Co-manager guidelines are followed. Fish health procedures used for disease prevention includes biological sampling of spawners, and (in 1992) prophylactic treatment of spawners with an approved therapeutant. Generally, sixty ovarian fluid and kidney/spleen samples are collected from female

spawners to test for the presence of viral pathogens. The enzyme-linked immunosorbent assay (ELISA) is conducted on kidney samples from 100 females. This assay detects the antigen for *Renibacterium salmonarium*, the causative agent of bacterial kidney disease (BKD).

Therapeutic and Prophylactic Treatments:

- Adult fall chinook are injected with antibiotics for the control of bacterial diseases.
- At spawning, eggs will be water-hardened in iodophor as a disinfectant.
- Juvenile fish will be administered antibiotics orally for the control of bacterial infections.
- Formalin (37% formaldehyde) is dispensed into water for control of parasites on fungus on eggs, juveniles and adult salmon. Treatment dosage and time of exposure varies with species, life-stage and condition being treated.

Only therapeutants approved by the U.S. Food and Drug Administration will be used for treatments.

7.8 Disposition of carcasses.

Carcasses of summer chinook spawned through the programs are buried on-site at Eastbank Hatchery or Wells Hatchery or returned to the Wenatchee, Methow, or Columbia River near the tail-race of Wells Dam for nutrient enrichment and productivity enhancement purposes.

7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

WDFW addresses this concern in the Wild Salmonid Policy (WDFW 1997), which states that even with a high level of genetic similarity between hatchery and wild fish, the hatchery component should not comprise more than 10% of the naturally spawning population, except in the case of supplementation programs intended to sustain the stock for reasons other than harvest (e.g., habitat degradation, hydropower dams, unforeseen catastrophic loss).

Current protocols for the summer chinook programs allow for the annual collection of 492 adults for the Wenatchee program, and 556 (Wells Dam east ladder) and 1,210 (Wells FH volunteers) for the Methow/Okanogan program. These adults provide gametes for the annual release of 2.36 million yearlings and 2.1 million sub-yearlings into upper Columbia Basin tributaries and the mainstem. Current broodstock collection protocols for the two programs are as follows (Petersen et al. 1999b and BAMP 1998, with reference to annual co-manager review and approval of broodstock protocols).

Measures to reduce sources of bias that could lead to a non-representative sample of the desired Wenatchee River broodstock source include trapping all fish randomly from the run at large and throughout the duration of passage to ensure proportional representation of the age and size structure of the returning population. Additional measures employed to reduce the risk of adverse genetic effects to the population include a collection date beginning no earlier than July 15 to exclude spring-run chinook from the broodstock.

Adverse effects on the natural summer chinook population, and on listed fish that may be encountered incidentally during trapping, including injury during handling, behavior modification, stress, or mortality, are minimized through the following measures:

1. The Tumwater Dam trap is actively operated 16 hours per day on a three day per week schedule between early June and mid-November to directly and continuously monitor fish captures. Fish captured in the Dryden traps have shown no obvious stress and negligible prespawning mortality, and fish passing upstream for natural spawning are apparently not delayed to a significant extent.
2. The inflatable dam used to direct fish into the Dryden traps will be operated in a manner

that does not lead to de-watering of stream areas below the dam, which could lead to stranding of fish in pocket waters. In addition, the dam will be kept inflated for the duration of any single trapping effort to minimize the likelihood for salmonid migration delays by maintaining a consistent stream flow pattern in the immediate vicinity of the dam.

3. The traps will be checked daily when it is in operation and captured fish will be removed.
4. All fish passed upstream will be enumerated by species.
5. All listed and non-listed fish not needed for authorized supplementation programs will be held
   for a minimal duration in the trap and released upstream without harm.
6. The capture of adult salmon at Dryden and Tumwater dam traps does not rely on fish weirs, and all downstream migrating fish can pass the collection site freely year-round.

Dryden Dam There are two fishways with upstream migrant traps at Dryden Dam, both are located on the banks. The right bank trap is the primary broodstock collection facility. It has a steep pass structure to transfer adults into a holding box, which can be carried by gantry to a tank truck. Fish can be transferred without handling. An inflatable dam was built on the right bank sill to increase trap efficiency; when the dam is inflated, flow is displaced through the right and left fishways. There is potential for adult and juvenile salmonid stranding immediately below the dam during inflation, and there is potential for stranding downstream of the center and left legs of Dryden Dam during deflation. Captured fish show no obvious stress and negligible prespawning mortality, and fish passed upstream for natural spawning are apparently not delayed. The left bank trap is capable of collecting all large upstream migrants that pass the left bank fishway. Bar spacing in the trap is 5 cm. It contains a false bottom, which can be raised to collect trapped fish with a dip net. There are three concerns over extensive use of this trap: (1) the trap may be a safety hazard to hatchery staff, (2) smaller fish may be able to pass through the bars of the trap, causing potential for selectivity based upon size, and (3) sockeye salmon run timing overlaps with summer chinook salmon--extensive trapping efforts on the left bank trap may delay sockeye salmon passage.

Section 8. Mating

8.1 Selection method.

Spawners are collected randomly from the run at large arriving at the trapping locations during the July - August summer chinook salmon migration period. Beginning (late June or early July) and ending (late August) dates set for trapping help ensure that only summer chinook salmon are used in these programs. Adult collection at Wells Dam is managed throughout the season in response to fish counts at Rocky Reach Dam to ensure adequate escapement above Wells Dam. A portion of each day's egg-take is used for on-site production at Wells Hatchery to help ensure that the hatchery broodstock remains genetically similar to, and representative of, the up-river summer chinook populations. A portion of each days egg-take is used for on site production to help ensure that the hatchery broodstock remains genetically similar to, and representative of, the up-river summer chinook populations. A 1:1 mating scheme is employed.

8.2 Males.

Males may be live-spawned on the first spawning day as necessary to make up for a low naturally-occurring male to female ratio. However, inclusion of jack chinook in the run-at-large broodstock collections helps to alleviate occasional low adult male occurrence.

Collect jacks in similar proportion to the run-at-large. Inclusion of jack chinook in the run-at-large broodstock collections helps to alleviate occasional low adult male occurrence. The hatchery broodstock remains genetically similar to, and representative of, the up-river summer chinook populations.

8.3 Fertilization.

Spawning protocols reflect the need to maintain genetic diversity of the separate summer chinook populations. Summer chinook collected from the Wenatchee River and at Wells Dam are maintained at Eastbank Hatchery as separate populations and spawned at a 1 male to 1 female ratio. Gametes of the least numerous sex are split into subsets and these are crossed with gametes from a different individual of the more numerous sex. At Wells Hatchery, gametes from fish with CWTs that volunteer to the hatchery trap are held separately until the origin of the fish is determined.

Fertilization methods The following strategy will be used to fertilize Wenatchee summer chinook salmon:
(1) breed as many parents as is feasible;
(2) mate at least one male per female in daily matings; whenever possible, split the gametes of the least numerous sex into subsets and cross each subset with gametes from a different individual of the more numerous sex;
(3) live spawn males, and mark them after their use.

8.4 Cryopreserved gametes.

Cryopreserved gametes are not used.

8.5 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

- A portion of each days egg-take is used for on site production to help ensure that the hatchery broodstock remains genetically similar to, and representative of, the up-river summer chinook populations. A 1:1 mating scheme is employed.
- Males may be live-spawned on the first spawning day as necessary to make up for a low naturally-occurring male to female ratio. However, inclusion of jack chinook in the run-at-large broodstock collections helps to alleviate occasional low adult male occurrence.

- Collect jacks in similar proportion to the run-at-large. Inclusion of jack chinook in the run-at-large broodstock collections helps to alleviate occasional low adult male occurrence. The hatchery broodstock remains genetically similar to, and representative of, the up-river summer chinook populations.
- Fish health procedures used for disease prevention include biological sampling of spawners. Generally, sixty ovarian fluid and kidney/spleen samples are collected from female spawners to test for the presence of viral pathogens. The enzyme-linked immunosorbent assay (ELISA) is conducted on kidney samples from 100 females. This assay detects the antigen for *Renibacterium salmonarium*, the causative agent of bacterial kidney disease (BKD).

Section 9. Incubation and Rearing.

9.1.1 Number of eggs taken and survival rates to eye-up and/or ponding.

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Egg Survival Perfor-mance Std.	Fry-fingerling Survival (%)	Rearing Survival Perfor-mance Std.	Fingerling-Smolt Survival (%)
1990	163,109	80.9	96.6	98.0	97.6	72.0	98.8
1991	247,000	86.9	96.1	98.0	94.8	72.0	98.1
1992	827,911	79.8	97.8	98.0	97.3	72.0	98.1
1993	1,133,852	84.2	97.5	98.0	98.8	72.0	98.8
1994	999,364	83.7	100.0	98.0	95.3	72.0	98.4
1995	949,531	86.0	100.0	98.0	74.9	72.0	90.8
1996	756,000	84.1	100.0	98.0	94.4	72.0	97.7
1997	554,617	82.6	82.6	98.0	96.3	72.0	98.2
1998	854,997	80.9	98.3	98.0	97.1	72.0	99.8
1999	1,182,130	90.4	97.9	98.0	96.1	72.0	99.4
2000	1,113,159	88.3	98.0	98.0	96.0	72.0	98.9
2001	733,882	88.3	98.0	98.0	96.0	72.0	98.9
2002	972,500	88.3	98.0	98.0	96.0	72.0	98.9
2003	847,500	88.3	98.0	98.0	96.0	72.0	98.9
2004	Na	Na	Na	Na	Na	Na	Na

The program survival standard from fertilization to ponding is 90.0 %. The survival objective from fertilization to release is 65.0 %. The egg survival objective: green egg to the eyed stage is 92.0 %; the eyed egg stage to ponding is 98.0 %; 30 days post ponding is 97.0; 100 days post ponding is 93.0; and ponding to smolt is 72%.

Table 11. Fecundity for Summer Chinook in the Upper Columbia (WDFW Database 2005).

Stock	Field	1999	2000	2001	2002	2003	5 YR Avg.
MEOK	Females Spawned	254	210	152	233	237	1086
	Estimated Egg Take	1,246,450	1,038,800	750,000	1,147,500	1,175,000	5,357,750
	Fecundity	4,907	4,947	4,934	4,925	4,958	4,933
Wells	Females Spawned	503	564	525	577	575	2744
	Estimated Egg Take	2,475,000	2,780,000	2,620,000	2,850,000	2,850,000	13,575,000
	Fecundity	4,920	4,929	4,990	4,939	4,957	4,947
Wenat-chee	Females Spawned	247	211	152	204	171	985
	Estimated Egg Take	1,220,050	1,040,000	745,200	972,500	847,500	4,825,250
	Fecundity	4,939	4,929	4,903	4,767	4,956	4,899

9.1.2 Cause for, and disposition of surplus egg takes.

In the event that circumstances, such as unanticipated, higher-than-expected fecundity, or high egg-to-fry survival rates, lead to the inadvertent possession of salmon substantially in excess (>110 percent) of program production levels specified above, then surplus eggs or fish shall be culled from the population in a manner consistent with achieving program goals.

9.1.3 Loading densities applied during incubation.

Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations were followed for water quality , flows , temperature , substrate and incubator capacities. Heath stack incubators are used to incubate the summer chinook eggs at Eastbank Hatchery and Wells Hatchery. Incubation conditions at the two hatcheries are designed on loading densities recommended by Piper et al. (1982).

9.1.4 Incubation conditions.

Influent and effluent gas concentrations at the hatcheries and within the acclimation ponds, including dissolved oxygen concentrations, are within parameters optimal for juvenile salmonid production and survival. Eastbank Hatchery has adult holding pond space for the Wenatchee and Wells east ladder trapped fish (Methow/Okanogan) summer chinook broodstock, 70 half-stacks of vertical incubators equipped with a chilled water supply, eight 3,750 cu ft raceways and five 22,200 cu ft raceways (Chapman et al. 1994). This water varies in temperature from a low of 46° F in May to a high of 57° F in December.

9.1.5 Ponding.

Summer chinook fry are transferred from Heath trays for ponding upon button-up and swim-up. Ponding generally occurs after the accumulation of 1,650 to 1,750 temperature units. Unfed fry are transferred to the rearing ponds from early May through early June. The normal weight for fry initially ponded at Eastbank Hatchery for brood years 1989-95 was 0.45 grams (1000 fish per pound). The fry fork length recorded for the same brood years was 36 to 40 mm.

9.1.6 Fish health maintenance and monitoring.

Eggs will be examined daily by hatchery personnel. Prophylactic treatment of eggs for the control of fungus is prescribed by fish health specialists, and may include treatment with formalin or other accepted fungicides. Non-viable eggs and sac-fry will be removed by bulb-syringe. Adherence to WDFW, Pacific Northwest Fish Health Protection Committee, and IHOT (1995) fish disease control policies reduces the incidence of diseases in fish produced and released from Eastbank facilities. No fish disease outbreaks have been experienced during the incubation to ponding period in the summer chinook programs in recent years and mortality levels have remained within program standards. Fish health is continuously monitored in compliance with Co-manager Fish Health Policy standards (WDFW and WWTIT 1998). Rearing space at Eastbank was designed to maintain maximum loading densities below the criteria of Piper et al. (1982), as modified by Wood (Chelan PUD and CH2MHILL 1988).

9.1.7 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

Incubation units are isolated by program. Isolation curtains prevent splashing between units. Formalin drips are applied to prevent fungal spread from a small group of dead eggs. Flow, D.O. and temperature units (TU) are monitored per IHOT or program guidelines.

9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1990-2001), or for years dependable data are available.

The program survival standard from fertilization to ponding is 90.0 %. The survival objective from fertilization to release is 65.0 %. The egg survival objective: green egg to the eyed stage is 92.0 %; the eyed egg stage to ponding is 98.0 %; 30 days post ponding is 97.0; 100 days post ponding is 93.0; and ponding to smolt is 72%.

Table 12. Wenatchee and Methow/Okanogan summer chinook program survival summary by life stage (1989-1993 brood years).

Percent survival by life stage		Brood Year				
		1991	1992	1993	1994	1995
Adult (holding)	**Wenatchee**	90.7	85.7	95.4	94.5	94.7
	Methow/Okanogan	92.4	95.0	83.7	83.1	89.3
Egg	**Wenatchee**	86.9	79.7	81.7	83.7	86.0
	Methow/Okanogan	88.2	87.0	83.0	86.6	82.3
Fry	**Wenatchee**	96.6	97.8	99.6	99.2	96.7
	Methow/Okanogan	97.1	98.0	99.8	98.1	96.5
Rearing	**Wenatchee**	95.7	97.2	98.1	92.3	71.3
	Methow/Okanogan	98.4	95.5	99.5	70.6	89.0
Overall (fertilization to release)						
	Wenatchee	**80.3**	**75.5**	**79.4**	**79.8**	**64.4**
	Methow/Okanogan	**84.2**	**78.2**	**76.7**	**63.3**	**76.6**

9.2.2 Density and loading criteria (goals and actual levels).

The rearing conditions at Wells and Eastbank hatcheries (as well as its acclimation ponds) are designed on loading densities recommended by Piper et al. (1982; 6 lb/gpm and 0.75 lb/ft3) and Banks (1994; 0.125 lb/ft3/in) (BAMP 1998). Fry are transferred from the Heath incubation trays to fiberglass rearing tanks for start feeding, and then to raceways for continued rearing. The tanks have flow through water circulation. Fingerlings are transferred to the acclimation ponds in the tributaries in October (Carlton Ponds) and February (Dryden and Similkameen).

9.2.3 Fish rearing conditions.

Fish are reared on a combination of well, river, and an un-named creek sources on station and reuse water in final rearing. Temperature, dissolved oxygen and pond turn over rate are monitored. IHOT standards are followed for: water quality, alarm systems, predator control measures (netting) to provide the necessary security for the cultured stock, loading and density. Settle-able solids, unused feed and feces are removed regularly to ensure proper cleanliness of rearing containers. All ponds are broom cleaned as needed and vacuumed monthly for the yearling pond. Ponds are pressure washed between broods. Temperature and dissolved oxygen are monitored and recorded daily during fish rearing. Temperatures during the rearing cycle range from a high of 60 degrees F to a low of 33 degrees F.

9.2.4 Indicate biweekly or monthly fish growth information (average program performance), including length, weight, and condition factor data collected during rearing, if available.

The normal weight for fry initially ponded at Eastbank Hatchery for brood years 1989-95 was 0.45 grams (1000 fish per pound). The fry fork length recorded for the same brood years was 36 to 40 mm.

Table 13. Length, weight, and condition factor data for 1995 brood summer chinook reared through

the Wenatchee supplementation program (Eastbank over-winter to Dryden Pond) (from Petersen et al. 1999b).

Date	Fork Length mm	SD	CV %	Weight (gms)	Condition Factor (Kfl)
June 29	44.2	2.13	4.8	0.9	1.0
Aug. 1	59.4	4.24	7.1	2.3	1.1
Sept. 1	72.1	4.30	6.0	4.1	1.1
Sept. 27	77.6	7.55	9.7	5.9	1.3
Oct. 24	93.7	8.23	8.8	9.1	1.1
Oct. 31	96.5	10.50	10.9	10.2	1.1
Nov. 30	103.5	13.54	13.1	12.9	1.2
Jan. 1	114.0	16.74	14.7	19.1	1.3
Feb. 1	123.9	24.798	20.0	25.4	1.3
Feb. 26	126.7	20.43	16.1	23.1	1.1
Feb. 28	123.3	23.59	19.1	24.4	1.3
Apr. 4	133.8	17.44	13.0	27.7	1.2
May 6	149.4	22.68	15.2	42.4	1.3

Table 14. Length, weight, and condition factor data for 1995 brood summer chinook reared through the Methow/Okanogan supplementation program (from Petersen et al. 1999b).

Date	Fork Length mm	SD	CV %	Weight (gms)	Condition Factor (Kfl)
Carlton Pond					
June 29	41.0	2.13	5.2	0.6	0.91
July 31	55.0	3.34	6.1	1.8	1.07
Aug. 30	65.5	4.31	6.6	3.2	1.13
Sept. 27	76.0	5.92	7.8	5.2	1.19
Oct. 31	91.6	7.19	7.9	7.9	1.03
Nov. 30	111.9	8.90	8.0	15.2	1.08
Jan. 1	112.2	13.61	12.1	16.8	1.07
Jan. 31	143.4	11.68	8.2	33.6	1.14
Mar 3	142.5	23.81	16.7	34.9	1.21
Mar. 18	148.5	25.09	16.9	39.9	1.22
Apr. 22	160.3	22.96	14.3	50.5	1.23
Similkameen Pond					
May 31	40.2	1.64	4.1	0.6	0.9
June 29	50.5	2.89	5.7	1.3	1.01
Aug. 1	66.8	6.18	9.3	3.6	1.2
Sept. 2	86.0	7.25	8.4	7.9	1.3
Sept. 27	105.1	8.4	8.0	15.2	1.3
Sept. 30	106.5	8.17	7.7	12.9	1.1
Oct. 31	128.5	8.61	6.7	25.4	1.2
Nov. 5	128.7	8.41	6.5	25.5	1.2
Dec. 3	133.8	9.25	6.9	27.5	1.2
Jan. 3	135.3	10.31	7.6	27.1	1.1
Feb. 4	134.6	10.07	7.5	25.2	1.0
Mar. 31	136.7	13.87	10.2	32.8	1.3

9.2.5 Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Table 15. Results of organosomatic index (OSI) sampling conducted on 1995 brood juvenile Wenatchee and Methow/Okanogan summer chinook salmon (from Petersen et al. 1999b).

Date	Specific Indices (%) mesenteric fat	Combined Indices (%) normality	Combined Indices (%) feeding	Blood Constituents Hematocrit % volume (SD)	Blood Constituents Leucocrit (SD)	Blood Constituents Plasma Protein g/100 ml
Wenatchee						
Feb. 26	68.8	85.5	28.3	50.70 (6.14)	0.10 (0.00)	6.28 (0.57)
Mar. 4	42.5	100.0	58.3	50.60 (5.72)	0.10 (0.00)	5.72 (0.47)
May 6	30.0	9725	75.0	47.20 (5.55)	0.33 (0.27)	4.50 (1.78)
Carlton						
Oct. 22	42.5	100.0	38.3	49.8 (5.9)	0.3 (0.2)	6.5 (1.2)
Mar. 18	65.0	92.5	33.3	45.4 (5.0)	0.1 (0.1)	5.2 (0.6)
Apr. 8	35.0	92.5	40.0	50.2 (4.1)	1.0 (0.0)	4.9 (0.8)
Apr. 22	56.3	96.0	21.7	49.8 (4.5)	0.5 (0.3)	5.4 (0.8)
Similkameen						
Sept. 27	63.8	98.5	80.7	47.8 (4.6)	0.2 (0.2)	6.7 (0.9)
Mar. 31	31.3	95.5	86.7	52.4 (7.4)	0.7 (0.2)	6.0 (0.7)

9.2.6 Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Commercial-grade moist or semi-moist fish feed is used in the operation, and applied at sizes appropriate for the size of the fish being fed. The daily amount fed is determined by the number of fish in the population and individual fish weight. Feed is therefore applied at a daily rate ranging from 3.0 % of the total population weight per day (fry and small fingerlings) to 1.5 % of the total population weight per day for larger fingerlings. The expected feed conversion efficiency rate is 1.2.

Rearing Period	Food Type	Application Schedule (#feedings/day)	Feeding Rate Range (%B.W./day)	Lbs. Fed Per gpm of Inflow	Food Conversion During Period
Ponding to 400 fpp	BioDiet Starter 3	24	2.5-4.0	0.0010	0.7
400-300 fpp	BioMoist Grower 1.0 mm	12	2.2	0.0011	0.75
300-180 fpp	BioMoist Grower 1.3 mm	4	2.2	0.0015	0.75
180-100 fpp	BioMoist Grower 1.5 mm	1	2.0	0.0090	0.8

100-45 fpp	BioMoist Grower 2.0 mm	1	2.0	0.0191	0.8
45-25 fpp	BioMoist Feed 2.5 mm	1	2.0	0.0171	0.9

9.2.7 Fish health monitoring, disease treatment, and sanitation procedures.

For all production programs under the Mid-Columbia Hatchery Program, standard fish health monitoring will be conducted (monthly checks of salmon and steelhead) by fish health specialist, with intensified efforts to monitor presence of specific pathogens that are known to occur in the donor populations (specific reactive and proactive strategies for disease control and prevention are outlined in Appendix I). Significant fish mortality to unknown cause(s) will be sampled for histopathological study. Fish health maintenance strategies are described in IHOT (1995). Incidence of viral pathogens in salmon and steelhead broodstock will be determined by sampling fish at spawning in accordance with the Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State. Populations of particular concern may be sampled at the 100% level and may require segregation of eggs/progeny in early incubation or rearing. Incidence of *Renibacterium salmoninarum* (Rs, causative agent of bacterial kidney disease) in salmon broodstock will also be determined by sampling fish at spawning. Where appropriate, collected broodstock will be sampled for enzyme-linked immunosorbent assay (ELISA). If required, hatchery staff will segregate eggs/progeny based on levels of Rs antigen, protecting low/negative" progeny from the potential horizontal transmission of Rs bacteria from "high" progeny. Progeny of any segregation study will also be tested by ELISA; at a minimum each segregation group would be sampled at release. Necropsybased condition assessments (based on organosomatic indices) will be used to assess condition of hatcheryreared salmon and steelhead smolts at release, and wild salmon and steelhead during outmigration. If needed, condition assessments will be done at other key times during hatchery rearing.

Fish health and disease condition are continuously monitored in compliance with Co-manager Fish Health Policy standards (WDFW and WWTIT 1998). Fish health and condition is onitored on-site by fish health professionals at the summer chinook rearing locations ten to fifteen times during the freshwater rearing period. In particular, summer chinook are screened prior to transfer and again at release for the incidence of bacterial kidney disease (BKD) through the ELISA process. Results of ELISA testing of `95 brood summer chinook indicate that the prevalence of BKD in the Wenatchee population was very low. The prevalence of BKD in the `95 brood Carlton Pond population was higher than the Similkameen Pond population. The `95 brood Carlton Program failed to meet the numerical release objective because of a BKD outbreak at Methow Hatchery, from which the smolts were transferred. The results of fish health monitoring for the summer chinook programs are presented each year in WDFW Rock Island Fish Hatchery Complex annual reports.

The general policy of the WDFW, the USFWS, and the Yakama Nation is to bury juvenile fish mortalities, and dead eggs to minimize the risk of disease transmission to natural fish. The action agencies may place at least some of the adult salmon carcasses in regional streams for nutrient enrichment purposes, consistent with permitting and disease certification protocols. If adult carcasses are not used for nutrient enhancement they will be buried or disposed of at a local waste disposal site. The distributing of spawned, dead carcasses into the natural environment should benefit natural fish productivity through nutrient enrichment. NMFS finds that risk to the listed populations is minimal if disease certification protocols are followed.

9.2.8 Smolt development indices (e.g. gill ATPase activity), if applicable.

Degree of smoltification is monitored through monthly collection of data indicating average condition factor (Kfl) of the populations (see Tables 7 and 8). Gill ATPase levels have been monitored in the past to attempt to indicate degree of smoltification. However, this index has not been found to be a useful tool for determining when to begin releases, due to the delay in obtaining results from sampling, and the finding that ATPase levels do not actually increase until the smolts are actively migrating in the Columbia River (Petersen et al. 1999b)

9.2.9 Indicate the use of "natural" rearing methods as applied in the program.

Natural rearing methods are approached through the transfer of most summer chinook smolts to acclimation ponds at release locations. The trapizoidal, hypalon-lined ponds provide a lower density rearing location for the fish on their home water. The ponds therefore provide a more natural setting for the populations than if the fish were retained in concrete raceways, and released at central locations or scatter-planted to the upper river tributaries.

9.2.10 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

Monitoring and evaluation measures are proposed to address data gaps that lead to uncertainty in the incubation and rearing protocols. These uncertainties include whether the release of ocean-type chinook salmon into the tributaries, areas of significant natural production, impose deleterious ecological effects upon natural fish are of concern. Natural summer chinook in the region are ocean-type populations, and the release of yearling fish through the hatchery programs, an out-migration strategy that differs from the natural population, is of concern. Whether the increasing incidence of "reservoir-reared" juveniles (Petersen and Murdoch 1998) in the natural population is related to the effects of hatchery practices or simply due to hydroelectric impoundments delaying sub-yearling migrations is presently unknown. Unknowns of this yearling release strategy include: the demographic aspects of returning hatchery adults originating from yearling releases; the potential for genetic changes from the natural population from differing selective processes on yearlings versus sub-yearlings; and, the effects of hatchery yearling releases upon natural juveniles. Carefully developed hatchery operation and evaluation programs, such as those developed for the Rock Island Hatchery Complex (RIHC), will be a component of the Mid-Columbia Hatchery Program (BAMP 1998) to identify the hazard of each hatchery program to the listed species, and the means to quantify this risk.

Section 10. Release

10.1 Proposed fish release levels.

672,000. In the Columbia River, ocean-type chinook salmon released as yearlings have consistently survived better than those released as sub-yearlings In the Columbia River, the benefits of rearing juveniles through a yearling stage include (1) improved passage through hydroelectric dams, through coincidental timing of releases with increased flows and spill (Raymond 1988); (2) better fish guidance efficiency of yearlings at the dams because of behavioral and buoyancy changes (Giorgi et al. 1988); (3) decreased susceptibility to predators (Poe et al. 1991); and (4) improved swimming performance of larger smolts (Park 1969). Based upon smolt production numbers to necessary to achieve hatchery compensation objectives, the difference in production required between yearling and sub-yearling ocean-type chinook salmon is on the order of 0.24. In other words, for every 1,000 sub-yearling summer chinook smolts to be produced for compensation, 240 yearling smolts could be produced in lieu of the sub-yearlings. This ratio was derived from observed differences in survival between yearling and sub-yearling releases from Wells FH. The appropriate mix of yearling and sub-yearling smolts has been evaluated through the "Mid Columbia Hatchery Plan" to minimize the risk of this increased hatchery production on the existing natural production. At this time, hatcheries release ocean-type chinook salmon at both ages. Fish from the two rearing strategies encounter different selective processes (such as downstream migration conditions and ocean distribution), yet the demographic characteristics of those salmon released as yearlings have not meaningfully deviated from that of naturally produced fish, particularly in light of recent findings of "reservoir-reared" natural smolts. However, the demographic characteristics of the fish reared as yearlings will continue to be monitored, to ensure adaptability of hatchery fish to natural conditions. Demographic characteristics to be monitored will include, but not be limited to release to adult survival, age at return, length at age, sex ratio, and fecundity/length relation.

The current production goals for Wells FH are to release 484,000 sub-yearlings at 20 fpp, and 320,000 yearlings at 10 fpp. The current production goals for Eastbank FH include 400,000 yearlings for release from Carlton at 10 fpp, and 576,000 yearlings for release from Similkameen at 10 fpp.

10.2 Specific location(s) of proposed release(s).

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Yearling	864000	10	Mid April-Early May	Wenatchee	25.8	Wenatchee	Columbia Cascade

10.3 Actual numbers and sizes of fish released by age class through the program.

	Yearling Release		
Release Year	No.	Date (MM/DD)	Avg Size (fpp)
1991	720,000	April 19-May 24	10.0

1992	124,440	April 15-May 22	10.0
1993	191,179	April 22-May 25	10.8
1994	627,331	April 21-May 24	10.2
1995	900,429	April 15-May 17	13.0
1996	797,350	April 18-June 4	12.0
1997	687,439	May 8	10.7
1998	600,127	April 28	10.5
1999	408,223	April 27 -28	6.0 and 11.0
2000	649,612	May 1	9.0
2001	1,005,554	April 23	13.0
2002	929,496	April 16 and May 6	10.0 and 12.0
2003	604,668*	April 22 and April 23	10.8 & 11.2
2004	835,642	April 23 - 26	11.7
2005	-	-	-

*150,806 fish planted at Dryden Dam Right bank trap site.

10.4 Actual dates of release and description of release protocols.

Wenatchee River summer chinook are forced released as yearlings from Dryden Pond in late April or early May. Releases are made during the outmigration window of natural summer chinook. Summer chinook yearlings are released from Carlton Pond in mid- to late April. Similkameen Pond fish are released as yearlings in late March or early April. Wells Hatchery yearlings are released in April and sub-yearlings are released in June. Turtle Rock yearlings and sub-yearlings are also released in April and June, respectively.

10.5 Fish transportation procedures, if applicable.

Fish are not transported for release.

10.6 Acclimation procedures (*methods applied and length of time*).

Pre-smolts are transferred in early-mid February to Dryden Satellite, reared/acclimated, and force released during the period of mid-April to early May. Fingerlings are acclimated, reared to smolt size, and released at Wells Hatchery, Turtle Rock Hatchery, Carlton Pond, Dryden Pond, and Similkameen Pond. Plan views of these acclimation and release sites are attached. Turtle Rock Hatchery has four 400,000 cu ft rearing channels that may be used for summer chinook rearing. Each of the three acclimation sites has a single, trapezoidal pond with concrete end structures and hypalon floors and sloped sides. The volume of useable rearing space is 77,000 cu ft at Similkameen, 53,400 cu ft at Carlton, and 864,000 cu ft at Dryden.

10.7 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

Nearly all summer chinook produced through the WDFW programs in the region are marked with an adipose clip/coded wire tag combination to allow for visual identification of hatchery origin fish upon adult return, differentiation of hatchery fish from wild fish and from hatchery fish from the various release locations, and assessment of brood year fishery contribution and survival rates by release site. For 2005-06, Dryden Pond releases will be 100% CWT and adipose fin clipped.

10.8 Disposition plans for fish identified at the time of release as surplus to programmed or approved levels

Situation would be discussed with regional managers (WDFW, PUD, Tribes, etc.), and fish would be released from the Dryen Acclimation Pond, or distributed to other release sites in the Wenatchee River.

10.9 Fish health certification procedures applied pre-release.

All fish are examined for the presence of "reportable pathogens" as defined in the PNFHPC disease control guidelines, within 3 weeks prior to release.

Fish transfers into the subbasin are inspected and accompanied by notifications as described in IHOT and PNFHPC guidelines.

10.10 Emergency release procedures in response to flooding or water system failure.

Eastbank Hatchery

Screens and stoplogs at outlets of raceways would be lifted, and fish would be released into the Columbia River.

Dryden Acclimation Facility

Screens and stoplogs at outlets of raceways would be lifted, and fish would be released into the Wenatchee river.

10.11 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

Measures have been applied to ensure that artificially propagated summer chinook salmon juveniles that are released are ready to actively migrate to the ocean with minimal delay. To meet this condition, fish must be released at a uniform size and state of smoltification that ensures that the fish will migrate seaward without delay. Variance from this smolts-only release requirement shall only be allowed in the event of an emergency, such as flooding, water loss to raceways, or vandalism, that necessitates early release of ESA-listed steelhead to prevent catastrophic mortality. Any emergency releases made by the action agencies shall be reported immediately to the NMFS Salmon Recovery Division. The rearing and release strategies are designed to limit ecological interactions between hatchery and naturally produced fish. Fish are reared until smoltification has occurred within nearly the entire population, which reduces residence time in streams following release (Bugert et al. 1991). To indicate when fish should be allowed to volitionally migrate, physiological measures of the degree of smoltification within the hatchery population, including allowable fork length coefficient of variation maximums (CV less than 10%) and average condition factor at release targets (0.9 - 1.0) will be used for yearlings while size at time of release (50ffp) will be used for sub-yearling releases.

Through these practices, smolts will migrate seaward without delay, minimizing interactions with listed wild spring chinook and steelhead juveniles and smolts that rear in and/or migrate through

freshwater and estuarine areas. In addition, smolt releases will continue to be timed with water budget releases from upstream dams, to further accelerate seaward migration of released hatchery fish and reduce the duration of any interactions with wild fish. On-station rearing of spring chinook on parent river water in the upper Columbia region will also contribute to the smoltification process leading to reduced hatchery fish residence time in the rivers and mainstem migration corridors.

Variance from this smolts-only release requirement shall only be allowed in the event of an emergency, such as flooding, water loss to raceways, or vandalism, that necessitates early release of ESA-listed steelhead to prevent catastrophic mortality. Any emergency steelhead releases made by the action agencies shall be reported immediately to the NMFS Salmon Recovery Division in Portland.

All propagated summer chinook juveniles shall be externally and internally marked (i.e., CWT and adipose fin clipped) prior to release.

Fish have been monitored daily by staff during rearing for signs of disease, through observations of feeding behavior and monitoring of daily mortality trends. A fish health specialist has been monitoring fish health as least monthly. More frequent care will be provided as needed if disease is noted. Prior to release, population health and condition is established by the Area Fish Health Specialist. Adherence to WDFW, Pacific Northwest Fish Health Protection Committee, and IHOT (1995) fish disease control policies will reduce the incidence of diseases in hatchery fish produced and released. Fish health management programs affecting all stocks, and fish health activities specific for each complex, are detailed in Appendix II, under "Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread, or amplification of fish pathogens."

Section 11. Monitoring and Evaluation of Performance Indicators

11.1.1 Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

Monitoring and evaluation plans, and research projects will be developed by the HCP Hatchery Committees as described in Section 2.3.1 (Chelan and Douglas PUD Activities). Additional details of the monitoring and evaluation plan development time lines and responsibilities are provided in the three HCP agreements. Tasks proposed for consideration at this time, which, in all likelihood, will be included in the plans developed by the HCP Hatchery Committees, include monitoring within the hatchery facilities and monitoring of artificially propagated salmon in the natural environment.

WDFW submits annual reports as conditioned by Section 10 Permit # - 1347 covering the period from January 1- December 31 and due to NOAA Fisheries by January 31st of the year following release per permit Reporting and Annual Authorization Requirements; Section C.1-C.9. Specifically, the annual reports include detailed activities as per requirements including monitoring of performance indicators identified for the program.

Adult return information shall include the most recent annual estimates of the number and proportion of artificially propagated fish on the spawning grounds, and the number and location of artificially propagated adults that were recovered outside the release areas. Adult return information and results from monitoring and evaluation activities outside the hatchery environment should be included in the annual report or a separate report. If a separate report on monitoring and evaluation activities conducted outside the hatchery environment is prepared, it shall be submitted by August 31, of the year following the monitoring and evaluation activities (i.e., surveys conducted in 2003, report due August 31, 2004) to NMFS.

Within Hatchery Environment Monitoring Reporting includes: numbers, pounds, dates, tag/mark information and locations of fish releases; Standard survival benchmarks within the hatchery environment as defined by the HCP Hatchery Committees; Monitoring and evaluation activities that occur within the hatchery environment; Coefficient of variation around the average (target) release size immediately prior to their liberation from the acclimation sites as an indicator of population size uniformity and smoltification status;

Natural Environment Monitoring Reporting includes: Annual adult return information shall include estimates of the number and proportion of artificially propagated fish on the spawning grounds; The number and location of artificially propagated adults that were recovered outside the release areas (e.g., in fisheries or strays to other rivers); Total and index redd counts by tributary basin; Carcass recovery summary which includes sex, origin, tributary location, age, and stock data. Broodstock monitoring and collection summary by location, including summary of all species encountered. Summary of all activities monitoring juvenile UCR spring chinook salmon in the natural environment including trap locations, tributary or sub basin population estimates; Biological sampling conducted on artificially propagated and natural origin juveniles in the natural environment; injuries or mortalities of listed species that result from monitoring activities; and any other information deemed necessary for assessing the program defined by the HCP Hatchery Committees.

The Chelan PUD and Douglas PUD, in coordination with the HCP Hatchery Committees, shall develop five-year monitoring and evaluation plans for the hatchery that are updated every five years. The first monitoring and evaluation plans are due to be completed with in one year of the

issuance of the FERC order incorporating the HCP into the hydro project operation licenses. Existing monitoring and evaluation programs shall continue until replaced by the HCP Hatchery Committees newly developed five-year monitoring and evaluation plans. The Chelan PUD and Douglas PUD, shall assume the lead, and work in coordination with the HCP Hatchery Committees, in developing the ten year hatchery program reviews and directing the development of annual summary reports. The program reviews will determine if egg-to-fry and smolt –to-adult survival rates, and other appropriate hatchery program goals and objectives of the HCPs and the ESA section 10 permits have been met or sufficient process is being made towards their achievement. This review shall include a determination of whether artificially propagated production objectives are being achieved.

WDFW shall develop annual broodstock collection and spawning protocols for the sockeye salmon and chinook salmon artificial propagation programs. Protocols should be coordinated with the co-managers and HCP Hatchery Committees and must be submitted to NMFS by April 15 of the collection year.

The Permit Holders must report the take of any ESA-listed species not included in this permit or authorized under a separate ESA permit, when it is killed, injured, or collected during the course of enhancement/research activities. Notification should be made as soon as possible, but no later than two days after the unauthorized take. The Permit Holders must then submit a detailed written report of the non-permitted take. Pending review of these circumstances, NMFS may suspend enhancement/research activities.

11.1.2 Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

Staffing, and other support logistics for the upper Columbia River summer chinook production programs are provided by WDFW. Funding for the programs is provided by PUD No. 1 of Chelan County and PUD No.1 of Douglas County for the purpose of mitigation for lost fish production associated with hydroelectric power system development in the region. Staffing and funding are available and committed to allow at least partial implementation of data collection, and monitoring and evaluation, described in this section. Presently there is no formally funded monitoring and evaluation program for the Rocky Reach/Turtle Rock program (Chelan PUD), and only recent agreement with Douglas PUD to begin monitoring and evaluation of the Wells summer chinook program. Plan, tasks, and methods monitoring and evaluating objectives relative to summer chinook program performances.

11.2 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

WDFW submits annual reports as conditioned by Section 10 Permit # - 1347 covering the period from January 1- December 31 and due to NOAA Fisheries by January 31st of the year folloeing release per permit Reporting and Annual Authorization Requirements; Section C.1-C.9. Specifically, the annual reports include detailed activities as per requirements including monitoring of performance indicators identified for the program. Monitoring activities have already been approved by the permit. Any additional harm to listed fish beyond the permit allowances would be communicated immediately to NOAA Fisheries by the WDFW ESA response lead in the area for review or needed changes.

Section 12. Research

12.1 Objective or purpose.

Research is directed at determination of supplementation program contribution rates, the ecological and genetic effects of the program on the natural population.

12.2 Cooperating and funding agencies.

Chelan PUD (Funding)
Douglas PUD (Funding)
WDFW
Yakama Tribe
Colville Tribe
NFMS

12.3 Principle investigator or project supervisor and staff.

See also permit 1347 or 1482 (pending) annual reports.

12.4 Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

Upper Columbia River ESU spring chinook salmon (Oncorhynchus tshawytscha.
Upper Columbia River ESU summer steelhead trout (Oncorhynchus mykiss).
Upper Columbia River ESU Sockeye Salmon
Bull Trout populations (Columbia River Distinct Population Segment)

12.5 Techniques: include capture methods, drugs, samples collected, tags applied.

See also permit 1347 or 1482 (pending) annual reports.

12.6 Dates or time periods in which research activity occurs.

See also permit 1347 or 1482 (pending) annual reports.

12.7 Care and maintenance of live fish or eggs, holding duration, transport methods.

12.8 Expected type and effects of take and potential for injury or mortality.

See also permit 1347 or 1482 (pending) annual reports.

12.9 Level of take of listed fish: number of range or fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

See also permit 1347 or 1482 (pending) annual reports.

12.10 Alternative methods to achieve project objects.

See also permit 1347 or 1482 (pending) annual reports.

12.11 List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

See also permit 1347 or 1482 (pending) annual reports.

12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury or mortality to listed fish as a result of the proposed research activities.

See also permit 1347 or 1482 (pending) annual reports.

Section 13. Attachments and Citations

13.1 Attachments and Citations

Biological Assessment and Management Plan (BAMP). 1998. Mid-Columbia River hatchery program. National Marine Fisheries Service, U. S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, Confederated Tribes of the Yakama Indian Nation,

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Petersen, K., A. Murdoch, M. Tonseth, T. Miller, and C. Snow. 1999a. 1994 brood sockeye and chinook salmon reared and released at Rock Island fish hatchery complex facilities. Report # SS99-02. Fish Program, Salmon and Steelhead Division. Wash. Dept. Fish and Wildlife, Olympia. 91 pp.

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Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

14.1 Certification Language and Signature of Responsible Party

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Take Table 1. Estimated listed salmonid take levels by hatchery activity.

Steelhead

ESU/Population	Upper Columbia Steelhead
Activity	Wells Hatchery Summer Chinook Program
Location of hatchery activity	Wells dam left and right bank ladder traps.
Dates of activity	Early May – mid-November
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)				
Collect for transport (b)				
Capture, handle, and release (c)			30 – 40 [1]	
Capture, handle, tag/mark/tissue sample, and release (d)				
Removal (e.g., broodstock (e)				
Intentional lethal take (f)				
Unintentional lethal take (g)				
Other take (specify) (h)				

[1] Yearly estimation of steelhead encountered during salmon broodstock collection (K. Peterson, WDFW, pers. comm. June 1997).

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category.

Take Table 2. Estimated listed salmonid take levels by hatchery activity. See also Permit #1196 Annual Reports. Numbers submitted here are those allowed in the permit.

Steelhead

ESU/Population	Upper Columbia Spring Chinook
Activity	Wells Hatchery Summer Chinook Program
Location of hatchery activity	Wells dam left and right bank ladder traps.
Dates of activity	Early May – mid-November
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)				
Collect for transport (b)				
Capture, handle, and release (c)			0[1]	
Capture, handle, tag/mark/tissue sample, and release (d)				
Removal (e.g., broodstock (e)				
Intentional lethal take (f)				
Unintentional lethal take (g)				
Other take (specify) (h)				

[1] Run timing separates the migration of listed upper Columbia spring chinook from summer chinook trapping time from June 28 – August 28. .

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

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